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UNIVERSITY OF TORONTO



REPORT OF THE DEAN
OF THE
FACULTY OF MEDICINE

Session 1958-1959

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THE DEAN OF THE FACULTY OF MEDICINE

In reporting the activities of the academic year just ended, the most immediate justification for a large staff and a considerable budget is obviously the evidence that the school is meeting its first obligation—the training of a new generation of doctors. The first step in such training is the completion of an undergraduate degree course in medicine. At the convocation for Law and Medicine on June 12, 144 young men and women qualified in that category. There were others who received degrees and diplomas significant of special postgraduate training: 2 Masters of Surgery, 25 Diplomates in Psychiatry, 21 Diplomates in Public Health, 1 in Industrial Health and 1 candidate for the degree of B.Sc. in Medicine.

Two distinguished Toronto men received honorary degrees, Mr. Justice Cartwright of the Supreme Court of Canada, and Dr. Edward Hall, himself a graduate in Medicine of the year 1935, and now President of the University of Western Ontario. At an earlier graduation, 56 young women were awarded Diplomas in Physical and Occupational Therapy. The prize list will be published elsewhere in the report which is circulated to the graduates.

Again during the year there has been discussion about methods of teaching and curricular changes. This ferment about how young men and women should be educated for medicine is world-wide, and will probably reach a climax in the second International Conference on Medical Education to be held in Chicago in the first week of September. It may be somewhat difficult to bring the meaning of medicine to a common international denominator. Conditions, environment and ideals still vary from East to West and from North to South, but nevertheless it will be useful to take stock of our own values and to define for ourselves in Canada what we expect from our doctors in the next quarter-century, and what sort of education and training we should provide for those who will bear the responsibility of this increasingly complex and varied discipline which we call medicine. The Faculty Committee to which I referred in the last annual report is increasingly aware that it will need the full-time services of a young teacher who will act as Executive Secretary, and is hopeful that financial and other arrangements for such an appointment may be made in the coming session.

The initial class in the two-year course in Speech Pathology and Audiology has completed the first year. The Faculty has sought authority for the establishment of a Division of Rehabilitation Medicine in which will be incorporated the present courses of Physical and Occupational Therapy and Speech Pathology and Audiology. It is hoped that under the new administrative arrangement there will be broader facilities for encouragement of rehabilitation in the community and opportunities for training doctors as well as ancillary workers in this important field.

The advent of hospital insurance in Ontario has been viewed with interest and some concern by those responsible for the maintenance of undergraduate teaching and of resident training programmes for young specialists. The Hospital Insurance Commission had two further meetings during the year with representatives of the medical schools and teaching hospitals. The Commission is disposed to leave any difficulties of maintaining teaching units of adequate size to the schools and hospitals concerned, rather than to legislate or make regulations governing such matters. The Commission has appointed a committee with representatives from each school in the province to which might be referred any matters which are related to the maintenance of a good climate for the education of doctors. The school representative on this committee will be advised in his own school by the superintendents of the teaching hospitals and the respective chairmen of the medical advisory boards of those hospitals.

In our own faculty there is a local committee under the able chairmanship of Dr. Botterell which reviews from time to time the whole question of medical school-hospital arrangements and the impact of health insurance on such relation-

ships. Failing any regulations from the government which will safeguard the "teaching unit," there will probably be need for a careful review of existing by-laws and agreements between the University and the various hospitals. Most of these agreements were made several years ago and need revision and strengthening in the light of new developments.

The various departmental reports reflect their respective interests in teaching, in research, and in aspects of community living which are related to health. The Department of Medical Biophysics completed its first year as an established department of the School of Graduate Studies.

The reports of published work, as well as the more detailed accounts of research, in all the departments are an index of the activity and interest of the school in matters of investigation. It is indeed exciting to read of the diversity of enquiry that characterizes the work of a modern medical centre. The school is grateful to those who manage the finances of the University for the provision of basic facilities and staff which makes research possible. While grants in aid of research come to us from many sources, we must have a reasonable nucleus of investigation-minded teachers and laboratories in which they can work before we can attract the very necessary added finances to aid their efforts. We are grateful again to the many granting bodies which have assisted us, particularly the Departments of National Health and Welfare and National Defence, and the National Research Council which has been able to increase substantially the amount of money available for medical research in Canada in the present fiscal year. It has been possible to procure some very important and costly pieces of research equipment, such as an electron microscope, through these grants. We acknowledge with grateful thanks substantial aid from the National Cancer Institute, the Ontario Heart Foundation, the Ontario Cancer Treatment and Research Foundation, the Canadian Life Insurance Officers Association, the Bickell Foundation and the McLean Foundation, as well as several private gifts and bequests. Money from the Senkler Estate has made it possible to purchase important equipment for researches in Pharmacology. Money from the Horne Estate has made it possible to provide service for the electron microscopes. Gifts from individual donors have provided fellowships in special fields of graduate training.

The McLaughlin Foundation continues to be of the greatest support in its own special field, affording opportunities for selected young teachers to broaden their experience in other schools and other countries before taking up their appointments as members of the staff. We also acknowledge gratefully undergraduate bursaries and scholarships from individual donors, as well as steadily increasing help in this field from our own Medical Alumni Association.

The University committee which was chaired by Vice-President Ross and which reported to the Senate on the question of student aid made certain recommendations that have given rise to much discussion of this whole question at both the federal and provincial levels of government. The report referred to the evidence of the Atkinson study which left little doubt that large numbers of capable and qualified young men do not even try to gain entrance to a university because of the financial burdens involved. There is a good deal of assistance from various sources for the students who are in a university and are successful in their courses. There is need for recognition and assured and liberal help for the young and well-qualified students who are leaving the high schools of the smaller communities.

There is also need, and this point was recognized by the University committee, for administrative means of integrating and using to the maximum advantage for those in need of it, the large and varied sources of student help which are at present available.

The activities of the Division of Postgraduate Medical Education are described in Dr. Macdonald's report. The programme of decentralized medical education supported in part by the Government of Ontario and the Ontario Heart Foundation is being reviewed in the light of the continuing enthusiasm and co-operative spirit of the local groups in the towns where our monthly clinics have been established.

New short courses such as that on "Surgical Emergencies in General Practice" are being planned at local hospitals. Other courses which have been popularly received in the past are being continued. The long-term training programme in the various specialities continues to draw large numbers of applicants, and the planning of the postgraduate education and training of these young men and women, which frequently extends over a five-year period, adds a considerable responsibility to the heads of the various departments concerned.

Honours

Professor B. Cinader received a D.Sc. degree from the University of London. Professor H. E. Johns received the degree of Doctor of Laws from the University of Saskatchewan. The Honorary Degree of Doctor of Medicine was conferred on Professor R. F. Farquharson by Laval University. Professor E. F. Brooks was elected a Fellow of the Royal College of Physicians of London. Dr. N. M. Wrong was elected Vice-President of the American Academy of Dermatology and Syphilology. Professor D. E. Cannell was Guest Professor at The Institute of Obstetrics and Gynaecology, University of London. Dr. R. G. C. Kelly was elected Assistant Secretary to the Pan-American Ophthalmological Society. Dr. A. Lloyd Morgan was elected President of the Canadian Ophthalmological Society. Dr. B. W. Fearon was elected a Fellow of the American Rhinological, Laryngological and Otological Society. Dr. G. A. Henry was elected to Fellowship in the American Laryngological Society. Professor A. L. Chute was named Chairman of the Canadian Council on Hospital Accreditation. Dr. S. H. Jackson was appointed Canadian representative to the Commission on Clinical Chemistry of the International Union of Pure and Applied Chemistry. Dr. Cecil Collins-Williams was elected President of the Ontario Allergy Society and appointed to the Board of Regents, American College of Allergists. Dr. C. P. Rance delivered the Janet Darling Memorial Lecture at Kingston General Hospital.

Professor E. A. Sellers was Chairman of the Symposium on Radiobiology of the Canadian Federation of Biological Societies held in Toronto. He was also appointed a member of the Defence Research Board Advisory Committee on Human Resources. Dr. W. Kalow was invited to present a paper at the Ciba Symposium on Human Biochemical Genetics in Naples. Professor G. H. W. Lucas served as director of a study on the relation of alcohol to traffic accidents, at the request of the Government of Ontario. Dr. J. W. Scott was elected to the Council of the American Electroencephalography Society, and Vice-President of the Eastern Association of Electroencephalographers. Dr. W. G. Bigelow was awarded one of the first International Awards of the Gairdner Foundation. Dr. R. W. Jackson received the Annual Award of the American Association for the Surgery of Trauma. Professor A. C. Singleton and Professor C. L. Ash were named official Delegates to the Ninth International Congress of Radiology. Dr. R. B. Holmes was elected to Fellowship in the American College of Radiology.

Dr. J. G. Dewan was named President-Elect of the Canadian Psychiatric Association. Professor A. B. Stokes was elected a member of the Council of the American Psychiatric Association. Professor K. J. R. Wightman was a Visiting Professor at the Middlesex Hospital Medical School in London. Mrs. Thelma Cardwell was elected Secretary-Treasurer of the World Federation of Occupational Therapists. Dr. A. T. Jousse was elected Vice-President of the Third International Congress of Physical Medicine. Professor C. H. Best was awarded a medal from the Royal Netherlands Academy of Sciences and Letters. He was also presented with a Civic Award of Merit by the City of Toronto, and elected to Honorary Membership in the Ontario Medical Association. Professor P. H. Greey was elected President of the Canadian Association of Medical Bacteriologists.

Visitors and Special Lecturers

Our exchange visitor from the Middlesex Hospital School in London was Mr. David Patey, the Director of Surgical Studies in that school. The Dean, at the

invitation of Dean Brian Windeyer of the Middlesex Hospital Medical School, had the very great privilege of spending a fortnight in London in April of this year, observing the teaching methods and organization there. The visit was extremely profitable and pleasant from the Toronto point of view, and we continue to value this exchange of men and ideas with this famous school in the London University group.

Mr. Benjamin Rank of Melbourne, Australia, a Sims Travelling Professor, gave the annual Balfour lecture. Sir Stewart Duke-Elder, who was awarded the Charles Mickle Fellowship for 1958-9, gave a special lecture on glaucoma in May to a large group of ophthalmologists and other interested scientists.

The Harry Shields lectureship in Anaesthesia has been established by an anonymous donor who undoubtedly had in mind the skilled services which Dr. Shields has rendered to so many grateful patients, and his wisdom and guidance as a teacher of young men in his own specialty. The first lecture under the Foundation is planned for the autumn of 1959.

On the occasion of the first Gairdner Foundation awards, the school was privileged to hear from each of the distinguished recipients of the awards a short and exciting report on current researches. The speakers were: Drs. Blalock and Taussig, Baltimore, Md., Drs. Ragan and Rose of New York, and Drs. Paton and Zaimis of London, England. Dr. Robert E. Gross gave the Phi Delta Epsilon lecture.

The opening of the neurosurgical unit in the Toronto General Hospital was an occasion which brought many distinguished visitors to our school. It was stimulating to hear our own Dr. Kenneth McKenzie call to mind the beginnings of neurosurgery in this centre, and to have again the opportunity to listen to old friends such as Dr. Penfield of Montreal and Sir Geoffrey Jefferson of Manchester. We were very happy to have the honour of a visit from the Dean of the Faculty of Medicine of Laval who came with three of his colleagues to spend the day in discussing and observing teaching methods and organization.

The establishment of the first Walter Wright lectureship in Ophthalmology, made possible by his old students and colleagues, gave the opportunity to a large audience to hear Professor Ashton of the London Institute of Ophthalmology in March of this year.

Buildings and Hospital Plan

Although the new buildings of the Toronto General Hospital were officially opened on May 15, there are several areas that are not yet functioning; this is largely due to a shortage of staff, particularly of nurses. This shortage is not peculiar to the General Hospital, but the sudden need for large numbers of staff highlights a situation that is becoming more acute in large centres. Doctors, who must in the long run bear the major responsibility for the care of the patient, are taking as they should an increased interest in how hospitals are managed, in how patients are handled during admission, and particularly in the care of the patient who is in hospital and requires varying degrees of personal attention for 24 hours of the day. It may be that there should be a comprehensive review of the patient's needs while in hospital, and an assessment of the training and requirements for those who care for them.

The new William E. Coutts research unit of the Toronto Western Hospital was officially opened recently, and the contracts are let for the further additions and alterations for which a very successful campaign of more than \$4,000,000.00 was completed last year. The Prime Minister of Ontario announced recently that the Wellesley Division of the Toronto General Hospital will resume its independence as a separate General Hospital, and will be expanded and modernized as a teaching hospital with its own Board of Governors.

Some time during my tenure of office I hope to report that the new Psychiatric Institute and Hospital is under construction. Another committee of government and university representatives has reported unanimously on the need for the Institute, and has agreed on certain principles of administrative detail. We are told that a site is being earnestly sought, and that the Government will proceed as soon as possible.

It is, of course, unnecessary to restate the great and urgent need for a modern building which will serve as a centre to encourage advancement in that field of medicine where there is so much to be done, and where we have already gathered so many men of enthusiasm and ability who work and wait for adequate tools and facilities.*

Staff

Dr. Harold Couch has retired from active teaching of surgery on the wards of the Toronto General Hospital, and Dr. Noonan has retired from the direction of the Maternity and Gynaecology wards of St. Michael's Hospital. These men have each given very valuable service to the school, both in undergraduate teaching and in the education of specialists. Dr. Ormsby has resigned from his teaching and research duties in the Department of Ophthalmology to devote his time to practice. Dr. Ormsby has himself made valuable contributions to research, and for several years has actively and vigorously worked for improved facilities and opportunities in the area of ophthalmic research. Dr. Vandewater leaves the Department of Anaesthesia to take charge of that department at Queen's University. We wish him well in his new responsibilities. Miss Olive Russell, who came to the medical office as an assistant in 1913, has left the chair from which she so often rose with a smile to meet visitors in the office. Graduates will all recall her uncanny memory as she greeted them after years of absence, not only calling them by name, but remembering where they practised, whether it was Africa, Georgia or the Arctic. We wish her years of happy and healthy leisure to enjoy the many things in which she is interested. Another well-known figure, Mr. Walter Cowan, has retired from active work in the Banting Institute. Those who were associated with animal experimental work on the fifth floor will remember him for his cheerful and enthusiastic assistance and his skill in all manner of things connected with the work of such a laboratory. We wish him health and happiness to enjoy his leisure.

Again it is a pleasure to record with grateful appreciation the cheerful and efficient work of those who are responsible for the secretarial work in a busy medical office, as well as the work of the Faculty Council and its various committees.

J. A. MACFARLANE

DIVISION OF POSTGRADUATE MEDICAL EDUCATION

Under the direction of R. Ian Macdonald

Approximately 500 graduate students were registered with the Division during the year. Of these, 83 were registered in diploma courses: in medical radiology (16), psychiatry (42), public health (21) and industrial health (4). There were 121 registered as internes or residents and 63 taking instruction in special courses in anaesthesia, anatomy, ophthalmology and oto-laryngology and the B.Sc. course in medicine. All of the students in these groups were working as full-time graduate students in either clinical or basic science departments. A regular series of lectures was scheduled for graduate students in Medicine, Surgery and Obstetrics and Gynaecology, and the Departments of Pathology and Anatomy also provided additional instruction at hours least likely to conflict with hospital and departmental responsibilities.

A large number of doctors active in practice took advantage of special courses given during the year in Toronto or of the extramural decentralized clinics in their own communities.

The first courses of the academic year were the Advanced Graduate Courses in Medicine, Surgery and Obstetrics and Gynaecology which extended for a six-week

*Since this report was written we are very gratified to hear that definite action has been taken on the part of the Government, and a site has been chosen for the new Institute.

period from mid-August to late September. Fifty-two students took these courses which have been given annually for many years and which provide doctors with considerable training and experience an opportunity for reviewing old knowledge, of adding new, and of discussing different views in the major specialties. The Medical Alumni Course, in which the Faculty co-operated, attracted some 275 doctors for a two-day course. Seventy-eight doctors registered for a course of two days on "The Orthopaedic Aspects of Low Back Pain." The Second Annual Refresher Course in Public Health and Preventive Medicine with the theme "The Health Supervision of Children" had 58 registrants. The Second Annual Course in Fractures and Trauma extended over a week and attracted 31 doctors, and a special course in Radioactive Isotopes had five registrants.

Decentralized clinics were held in 12 centres in Ontario where 54 university teachers conducted 29 clinics. Special clinics in cardiovascular disease with the support of the Ontario Heart Foundation were held in five centres with nine university teachers taking part. All of these extramural clinics were fairly well attended by the profession in the area visited and the university teachers who took part in them felt that they were useful to both the local doctors and the visiting teachers.

During the year, discussions were held with the Education Committee of the Ontario Medical Association and the Division has undertaken to co-operate in arranging for postgraduate clinics and for the teachers from this School asked for by different branch societies. It is believed that this will ensure more efficient use of postgraduate teachers and that it will make it easier for local medical societies to arrange for useful postgraduate programmes.

MEDICAL SOCIETY

(September, 1958, to June, 1959)

<i>Honorary President</i>	Dean J. A. MacFarlane
<i>Honorary Secretary-Treasurer</i>	Dr. W. G. Bigelow
<i>Chairman</i>	Dr. Robert Jackson
<i>President</i>	Douglas Wilson
<i>Vice-President</i>	Daniel Standret
<i>Treasurer</i>	Allan Hart
<i>Secretary</i>	Susan Attack

The Medical Society Assembly was fortunate this year in receiving wonderful support from the student body. Most of the members of the Assembly found that they were able to enlist numerous willing students to help them with their projects. Medical spirit, we discovered, does not need to be whipped, but only encouraged. The fact that the members of the Assembly were enthusiastic about their jobs and willing to work together is responsible for any success we enjoyed. Our shortcomings were mainly those which are inevitable in any student government whose members must fulfil many other obligations, as well as the duties of their position.

One of the most important stimuli to the members was the Assembly meetings. They were well attended and the members took an interest in each other's problems, which resulted in many valuable suggestions and interesting discussions. The person responsible to a great extent for the congeniality and effectiveness of our meetings was the Chairman, Dr. Bob Jackson, to whom we all owe a sincere vote of thanks.

An efficient secretary is the backbone of any organization and the Assembly benefited greatly from the reliable work of Susan Attack. My personal thanks go to her for all the assistance she has given this year.

To guard the bank balance of the Society was the task of Al Hart, our Treasurer, and his work was indeed praiseworthy. Al had the additional headache of separating the Duncan Room accounts from those of the Medical Society, and the accomplishment of this task will greatly clarify our financial status in the future.

The social activities of the Assembly were the responsibility of Dan Standret, our Vice-President. The post-war "Panacea" was revived in the autumn, complete with two bands, Monte Carlo games, fortune telling, water polo, basketball and many other sporting activities. The At-Home was even more successful than usual as we managed to break even financially for the first time in several years as well as having a most enjoyable evening.

Al Cecutti, the M.A.A. President, provided the students with excellent leadership in athletics. A new equipment room, the revision of the point system of awards and the establishment of the Tom Boeschstein Memorial Award were highlights of the year. "Participation" was the key to the varied athletic programme which resulted in three championships and several other finalists. Al Cecutti's fine personal effort during all his undergraduate years was recognized by the University which awarded him the Sidney Earle Smith Trophy for intramural athletics.

The M.W.U.A. was once again a powerful and highly efficient force within the Faculty, holding numerous banquets, teas and forums throughout the year as well as redecorating the Women's Common Room. Sally Saunders, as President, not only served them well but was also of great assistance in several projects of the Assembly—notably the redecorating of the Medical Society office and the Duncan Room.

We were fortunate in having hard-working Bill Franks as our Public Relations Director this year. Our Freshman Reception was well received and operated at a profit thanks to a well-attended dance at the Drill Hall on the opening day of school. Bill was also responsible to a large extent for the issue of the *Varsity* which was published by the Medical Society in February and composed entirely of articles by medical undergraduates. This was undoubtedly our finest public relations effort of the year. The *Probe*, our own student newspaper, continued to improve in quality. It has reached such a stature that next year the editor will be a voting member of the Assembly which should result in even better coverage of Faculty events.

Still in the field of literary endeavour, we are all proud of our *Medical Journal*, undoubtedly one of the finest undergraduate journals on the continent. Peter Moore and his staff are to be congratulated for maintaining the tradition of the *Journal*. Probably the most outstanding of this year's issues was the one concerned with recent advances in cancer research, written by Dr. Arthur Ham and his associates.

Once again *Daffydil* was enjoyed by all, almost one-third of the students participating in its production. Ticket sales became a problem for the first time in many years, and more publicity will be directed to the younger undergraduates next year. Ross Prince not only worked hard on the show but also took a genuine interest in the meetings of the Assembly.

Many of our so-called "cultural" activities are grouped under the Arts and Letters Committee which was ably directed by Bill McIntyre this year. The Osler Society, the Music Club, and the Debates Society all enjoyed an active year. Bill also organized the excellent addition to the Faculty of an art and photography contest. This competition was well received and now has a trophy, with the result that it will undoubtedly expand in the coming year.

The Staff-Student Committee was active again this year under the leadership of Ron Wintrob. A questionnaire on the value of the premedical course was circulated but has not been analysed as yet. A successful smoker was held once again and several class smokers were a worthwhile addition to the programme.

This year was unique for CAMSI in that the President of the national organization, Jules Harris, and the local CAMSI officer, Peter Adam, both sat on the Medical Society Assembly. The problems which are being investigated on our behalf by this organization are too numerous to mention, but the reprinting of examination papers for all students, the brief on student income taxes and the investigation of interns' salaries were especially notable. Plans for the National Conference in Toronto this fall are already being made by this energetic and efficient group.

Thanks to the efforts of our S.A.C. representatives, Bob Lee and Gloria Pierce, our campus prestige has never been higher. They both worked hard for the Council, but we were more aware of their efforts close to home as Gloria broke all records for

assisting on various committees of the Assembly, while Bob, along with Bill Franks, engineered the stealing of the Skule Cannon. This feat had not been accomplished for ten years and as a masterpiece of medical ingenuity, it added immeasurably to the spirit of the students. On the E.A.C. we were well represented by Joe Houston and Chris Hanley, who worked hard on their committees as well as on our Assembly.

The Warden of the Medical Society, Peter Van Nostrand, did an excellent job. Many additions were made to the Duncan Room—among them a new counter and display unit, a large trophy case, and new curtains. The recommendations of last year's Assembly with respect to the Medical Society office were brought into effect by a complete remodelling which was carried out last summer. We are now able to accomplish about twice the work in the same space and it is much improved in appearance as well.

A Student Aid Committee was formed under the chairmanship of Ken Adam, to study the proposals for financial aid to students which were made by President Bissell's Advisory Committee. Our committee has circulated a questionnaire to discover the financial situation of medical students, and they are preparing a report to be presented to the authorities concerned. The Minister of Education has acknowledged our interest in this problem, and members of our committee will be meeting with his advisors to discuss the proposals as they apply to medical students.

Our Alumni Association takes a genuine interest in all our activities. Its main contribution lies in the field of scholarships, loans and bursaries, but it also sponsored an excellent General Practice Forum and a Graduation Banquet with the fifty-year graduates.

All of our class presidents did tremendous jobs both within their own group and on the Assembly, where they served on many committees.

We should also like to thank Dean MacFarlane and Dr. Bigelow for the interest which they took in our activities, and for having us into their homes for very pleasant social occasions. We were honoured to be able to present a painting by Sir Frederick Banting and a book of student signatures to Miss Olive Russell at our final banquet, on the occasion of her retirement this summer. Her efforts on our behalf were deeply appreciated, and she will be sincerely missed by all the students.

I should like to express my sincere appreciation to all members of the Society for the support given me this year. It is with confidence that I wish Bob Lee and the new Assembly every success, and hope that they enjoy the same spirit of friendly co-operation which existed in our group.

DOUGLAS WILSON

MEDICAL ATHLETIC ASSOCIATION

(September, 1958, to June, 1959)

<i>Honorary President</i>	. . . . .	Dr. J. W. Graham
<i>President</i>	. . . . .	A. G. Cecutti
<i>Vice-President</i>	. . . . .	G. Sellery
<i>Secretary-Treasurer</i>	. . . . .	P. Wyschijnski
<i>Publicity Director</i>	. . . . .	J. Henderson
<i>Quartermasters</i>	. . . . .	G. Taylor
		E. McCutcheon
<i>IV Medical Representative</i>	. . . . .	I. N. Grosfield
<i>III Medical Representative</i>	. . . . .	F. S. Matsalla
<i>II Medical Representative</i>	. . . . .	D. A. Baird
<i>I Medical Representative</i>	. . . . .	J. Zadiyko
<i>II Premedical Representative</i>	. . . . .	J. S. Brooks
<i>I Premedical Representative</i>	. . . . .	W. A. Riddolls

The purpose of the Medical Athletic Association this past year has been to work as a solid unit and to try to make the facilities of the intramural programme available

to all those interested. The four main projects this year were: a new sports equipment room; a staff-student golf tournament; revision of the points system for awarding athletic trophies, letters, and other awards; the institution of an award for the pre-medical years, the Tom Boeschenstein Memorial Award.

With the assistance of Dr. Duckworth of the Anatomy Department, a room for equipment was selected in the basement of the Anatomy Building. The necessary remodelling, including building of cupboards and a counter, was done during the summer months, and the room has already proved its value.

Most of the arrangements and advance publicity for the golf tournament were handled by B. Cutler, I Medical, and L. Loach, IV Medical, during the summer. The event was held the first week in October at St. Andrew's Golf Club with a banquet following the golf matches. The good turnout of students was gratifying, but only two staff members were present, Dr. S. Prichard and Dr. Wm. Hawke, both members of the staff in Paediatrics.

The Tom Boeschenstein Memorial Award is to be presented annually by a vote of the executive of the Medical Athletic Association to the student having completed the premedical course, who has contributed most to Intramural Athletics, adjudged by his qualities of leadership, sportsmanship, and participation. The first winner was Jerry Zadiyko, I Medical.

The fall sports provided two championships in tennis and minor league volleyball. The winter sports were highlighted by the championship in the senior university swimming tournament. Although the championships were few, all those who participated in intramural athletics had a good time, and that, after all, is our prime objective.

The climax of the year was the annual athletic banquet, held again at the Chez Paree Restaurant. The guest speaker, Dr. J. W. Graham, spoke on the history of sport from the ancient Greek Olympics to modern professional sports. Also in attendance were Dr. Dewar, substituting for the Dean who was called out of town suddenly; Mr. J. C. McCutcheon of the University Athletic Department; Dr. R. E. MacDonald, past President of the Medical Athletic Association; Dr. J. Stalker, past President of the Medical Society, and Professor H. Boeschenstein of the Department of German, who presented the award bearing his son's name.

All in all, the year was a successful one, both in participation in athletics and in new projects. More interest is being focused on the minor league sports which are less time-consuming but which offer a good opportunity for relaxation and exercise. This is borne out by the increased number of participants in volleyball and basketball this year.

I should like to express my gratitude to the members of my executive who made my job extremely easy by their co-operation and eagerness to work. I am sure that next year's executive under G. Sellery will accomplish bigger and better things, and I wish them every success.

A. G. CECUTTI

MEDICAL WOMEN'S UNDERGRADUATE ASSOCIATION

(September, 1958, to June, 1959)

<i>Honorary President</i>	. . . . .	Dr. Lois Lloyd
<i>President</i>	. . . . .	Sally Saunders
<i>Vice-President</i>	. . . . .	Dinah Gruber
<i>S.A.C. Representative</i>	. . . . .	Gloria Pierce
<i>Treasurer</i>	. . . . .	Bernice Znajda
<i>Secretary</i>	. . . . .	Jane Roseborough
<i>Social Convener</i>	. . . . .	Joy Armstrong

The many varied and interesting activities of the Medical Women's Undergraduate Association began with a party given by the graduating girls to welcome

the newcomers. It was held at the home of Dr. Lois Lloyd. As in the past, this sort of informal get-together seems to be the best means of helping the new girls to feel they are a part of the Faculty.

The Annual Initiation Banquet was held for the first time at the Town and Country Dining Room. Our guest speaker, Dr. J. K. W. Ferguson, gave us a very interesting history of the Connaught Laboratories, and also told us about some of the newer experimental research that is being done there at the present time. Needless to say, we were very honoured to have him with us.

Late in October, the Federation of Medical Women in Canada held a very pleasant tea for the undergraduates at the Women's College Hospital. During the afternoon the girls were invited to tour the hospital, and were much impressed, especially with the new wing.

Shortly before the Christmas holidays, our annual Christmas party was held. It was well attended and as in other years, many gifts were brought for children between the ages of two and sixteen, to be distributed by the University Settlement House.

The Medical Women's Alumnae of the University of Toronto held a very interesting and useful forum during February. The topic was how to prepare for, and get started in, a medical practice. Doctors in general practice, internal medicine, anaesthesia, paediatrics, and teaching and research all spoke. Undergraduates were then given the opportunity of talking informally with specialists in these and many other fields which interested them.

During the year we have started to refurnish the Medical Women's Common Room in the Medical Building. The University very kindly redecorated it for us last year and provided us with a new washroom. It is hoped that during the next two years it will be completely refurnished.

The year's activities ended with a tea, held at the home of Dinah Gruber, in honour of the graduating girls. A very amusing skit was presented by the third-year girls depicting how a medical school might be conducted one hundred years from now.

We have been very honoured to have Dr. Lois Lloyd as our Honorary President this year, and her constant friendliness and support were greatly appreciated.

The outgoing executive deserves many thanks for a job well done, and we wish all possible success to the executive for the coming year.

SALLY SAUNDERS

MEDICAL WOMEN'S UNDERGRADUATE ATHLETIC
ASSOCIATION

(September, 1958, to June, 1959)

<i>President</i>	. . . . .	Sylvia Kennedy
<i>Vice-President</i>	. . . . .	Ann Cuddy
<i>Treasurer</i>	. . . . .	Mary Trotter
<i>Secretary</i>	. . . . .	Inara Grava
<i>University Athletic Directorate</i>	. . . . .	Lillian Bobson

This year the M.W.U.A.A. entered teams in four major sports: basketball, baseball, volleyball and hockey. Although the turnout was good, it was difficult to contact the first premedical girls owing to the Common Room's not being available during the first half of the term.

The hockey team carried off the best record this year winning their league title; although they lost out in the semi-finals, this team showed that spirit and determination contribute a great deal to success. The basketball team collected four wins against

two losses, and improvement is foreseen for next season. The baseball and volleyball teams still lack the strong support enjoyed by basketball and hockey, but those who participated enjoyed themselves, and it is hoped that the participants will pass on their enthusiasm so that better representation may be achieved next year.

In the minor sports, two premedical girls placed second in both the indoor and the outdoor archery competition. A nucleus for a swimming team was formed and an enthusiastic representative promises an organized, competitive team for next season.

Medicine contributed members to the University intercollegiate basketball and archery teams and one member to the University Women's Athletic Directorate.

The athletic year closed with a very enjoyable banquet at the Kwong Chow Chop Suey House. Although the attendance was lower than the previous year, all present agreed that the individual attention of the hostess and the excellent food provided one of the most enjoyable banquets on record. Guest speaker was Dr. Jim Anderson, and his talk on building a sound foundation for future medical knowledge was received by all as good advice that we should all put into practice. Our former President, Dr. Margaret Norman, presented four Medical M's, three Pre-Med bars and University awards which included one Senior T, three Junior T's, and a citation. All winners were warmly congratulated by Dr. Norman.

The executive of 1958-9 receive my most sincere thanks for their assistance. It is hoped that all who took part in any phase of intramural or intercollegiate sports enjoyed the recreation and fellowship that such participation provides, and that they will continue to give their support in order to make next year equally successful.

SYLVIA KENNEDY

SCIENCE AND MEDICINE DIVISION OF THE UNIVERSITY LIBRARY

Reported by Mrs. M. Galt

A new era has begun for the Library and its readers. All new material will be classified in the Library of Congress Classification, which has recently been adopted by the Library. This will bring closely related material together on the shelves, and will eventually shorten the time required for books in process. The reclassification programme will establish a working collection in the new classification over the next ten years.

The medical collection continues to grow rapidly; approximately 2,000 volumes were added last year. New material required by the Department of Medical Biophysics, and the Speech Pathology and Audiology Course has been ordered. Thanks to the continued interest of the Faculty, the new book recommendations are keeping the collection up-to-date.

In addition to the study tables in Seminar No. 8, a few study tables have been placed in the Science and Medicine stack for individual research use.

The students were very much interested in an exhibit of snake bite kits and antivenin lent to the library by E. B. S. Logier.

In June, the Medical Library Association held its first Toronto meeting. There were 322 medical librarians, 65 of them representing American and Canadian medical schools and colleges, attending the morning session at the library. Addresses were given by Dean J. A. MacFarlane, Dr. A. G. Gornall, Dr. A. L. Chute and Mr. David Foley, Assistant Chief Librarian. The following members of the Faculty contributed to the meetings held at the Academy of Medicine and the King Edward Hotel: Dr. W. Boyd, Dr. J. W. A. Duckworth, Dr. J. K. W. Ferguson, Dr. R. A. Gordon, Dr. Stuart Gordon, Dr. R. M. Janes, Dr. R. C. Laird, Dr. Ian Macdonald, Dr. H. C. Pritzker, Dr. W. B. Spaulding.

REPORT ON REGISTRATION, SESSION 1959-60

First premedical year	131
Second premedical year	115
First medical year	155
Second medical year	158
Third medical year	148
Fourth medical year	139
Special students	7
Art as Applied to Medicine	3
Bachelor of Science (Medicine)	1
Diploma in Medical Radiology	17
Diploma in Psychiatry	37
Diploma in Public Health	21
Diploma in Industrial Health	5
Graduate students (including 60 in the Advanced Graduate Course) . . .	213
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Physical and Occupational Therapy	171
Speech Pathology & Audiology	14
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	1,335

FELLOWSHIPS, SCHOLARSHIPS, MEDALS AND PRIZES

Awarded at Convocation, June, 1959

GRADUATE

Canadian National Institute for the Blind Fellowships	E. Brodie, M.D. R. R. Toews, M.D.
William Goldie Prize	H. P. Higgins, M.D., F.R.C.P.(C)
Arch Hutchison Fellowship	K. Yamane, M.D.
Frances Esther Hutchison Fellowship	R. Volpe, M.D., F.R.C.P.(C)
Lister Prize	W. K. Lindsay, M.D., B.Sc.(Med.), F.R.C.S.(C), F.A.C.S. } <i>Aeq.</i> R. B. Salter, M.D., F.R.C.S.(C)
Alexander McPhedran Research Fellowship	J. L. Ruse, M.D.
Minister of Health Gold Medal	V. J. Butler, M.D. B. W. Steiner, M.B., Ch.B. } <i>Aeq.</i>
O'Keefe Fellowships in Oto-Laryngology	W. H. Johnson, B.Sc., Ph.D. J. Farkashidy, M.D.
James H. Richardson Research Fellowship	A. C. Strickler, M.D.
Starr Medals	T. S. Leeson, M.A., M.B., B.Ch. J. Logothetopoulos, M.D.
Helen L. Vanderveer Fellowship	F. R. Inman, M.D.

UNDERGRADUATE

Fourth Medical Year

Cody Gold Medal	D. R. Wilson
Cody Silver Medal	H. Schachter, B.A.
Cody Silver Medal	A. D. Baines
Dr. Benjamin W. Appleton Prize in Psychiatry . . .	I. N. Grosfield } <i>Aeq.</i> J. Hoffman
Butterworth Prize	A. J. Becker
Chappell Prize in Clinical Surgery	H. Schachter, B.A.
Dr. Jacob Goldstein Scholarship in Obstetrics and Gynaecology	H. Moldofsky
Hendry Memorial Scholarship	G. W. Perkin
Medical Alumni Association Scholarship	D. E. Warkentin
Special Medical Alumni Association Bursary . . .	Mrs. L. E. Sutherland
Ellen Mickle Fellowship	D. R. Wilson
Ontario Medical Association Prize in Preventive Medicine	G. S. Lansky H. Schachter, B.A. } <i>Aeq.</i>
Dr. Roy Simpson Scholarship in Paediatrics . . .	D. R. Wilson
Starkman Scholarship	D. R. Wilson

Third Medical Year

Franckel Memorial Award	J. Schatzker
J. F. Hartz Company Prize in Ophthalmology . .	Miss E. M. Chenault, B.A.
J. F. Hartz Company Prize in Oto-Laryngology . .	B. S. Goldman
Frank W. Horner Gold Medal in Paediatrics . . .	H. Crystal
	T. J. Harvey } <i>Aeq.</i>
Ronald S. Saddington Medal in Pathology . . .	B. S. Goldman
Samual Rotman Scholarship	E. E. Johnston
Starkman Prize in Pharmacology and Therapeutics .	R. E. Mathews
Starkman Scholarship	R. E. Mathews

Second Medical Year

John Copp Bursary	D. A. Baird
	N. Bruchovsky } <i>Aeq.</i>
Posluns Brothers Scholarship	L. M. Jerry
Sandoz Prize in Pharmacology	Miss B. G. Nelems

First Medical Year

Starkman Scholarship	Miss E. F. Manace
John Zoberman Scholarship	F. Rosen

Second Premedical Year

Famous Players Canadian Corporation Scholarship .	D. E. Payne
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ANAESTHESIA

Under the direction of Professor S. M. Campbell

There has been no change in the past year in the teaching in the third and fourth years. In the two-year postgraduate course there have been twenty trainees serving as assistant residents in the Toronto hospitals, and in addition five residents have had a third-year appointment.

Dr. Raymond L. Matthews has been in the British Isles, and Scandinavia on a McLaughlin Fellowship for one year and will return to an appointment at the Toronto General Hospital, July 1. Dr. Brian Marshall, Dr. D. I. Matheson and Dr. Wells Renwick have been spending a year in Medicine at Sunnybrook Hospital, following three years' training in Anaesthesia in this Department, and on July 1 Dr. Marshall will join the staff at the Toronto General and Drs. Matheson and Renwick will go on the staff at the Toronto East General.

The Department has been honoured in having one of the younger staff men selected for appointment as Associate Professor and Head of the Department of Anaesthesia at Queen's University, Kingston. While we feel very sorry to lose Dr. S. L. Vandewater, who has contributed so much to the research and teaching in the Department, we wish him well and congratulate him on receiving this appointment which takes effect January 1, 1960.

As usual the Basic Science and other clinical departments have been most helpful and co-operative in assisting in the postgraduate training programme. The Departments of Anatomy, Pharmacology and Physiology must be specially mentioned in this regard.

Dr. J. W. Reingwertz has been working part-time in the Department of Pharmacology on the efficiency of soda-lime in the absorption of carbon dioxide, under a grant from the Burroughs Wellcome Company.

The Committee set up under Dr. R. A. Gordon to enquire into the advisability of establishing an anaesthetic research department, after very extensive enquiry into experiences in some twenty major medical centres, has brought in a report strongly recommending the establishment of such a sub-department, with its own laboratories, under an associate professor. This report is being brought forward for consideration.

It was with a great deal of pleasure that we were able to announce the establishment, through the generosity of an anonymous donor, of the Dr. Harry Shields Lectureship in Anaesthesia, to be presented annually by an anaesthetist or scientist of note. The first of these lectures, honouring the former head of the Department will be given on October 30 with Dr. Shields present, by Dr. Harold Griffith, Professor Emeritus of Anaesthesia, from McGill University.

Members of the Department have presented papers outside the University as follows: Dr. G. D. M. Boddington, to the Sault Ste. Marie Medical Society on, "The Use of the Newer Anaesthetic Agents," and "Anaesthetic Emergencies—Cause, Prevention and Treatment"; Dr. Alan Conn, to the Western Division of the Canadian Anaesthetists' Society (Vancouver, B.C.), on "Anaesthesia for Cardiovascular Surgery"; Dr. A. J. Dunn, to the District Medical Society at Orillia, Ontario, on "Balanced Anaesthesia"; Dr. H. Barrie Fairley, to the Annual Meeting of the Canadian Anaesthetists' Society at the Seignior Club on, "A Respiratory Therapy Unit," and to the Meeting of the American College of Surgeons at Montreal on "Hypothermia for Cardio-vascular Surgery—Problems and Practices." Dr. H. B. Fairley on behalf of the Ontario Heart Foundation made a tour of three American centres to visit post-cardiac surgery Intensive Therapy Units, and the Respiratory Treatment Unit of the University of Minnesota. His report was printed and circulated by the Ontario Heart Foundation to all cardiovascular surgery and anaesthetic departments across Canada. Dr. R. A. Gordon spoke at the Canadian Civil Defence College, Arnprior, Ontario, on "Anaesthesia for Mass Casualties," and at the University of Kansas Annual Post Graduate Course in Anaesthesiology: (1) "Anaesthesia for Minor Procedures," (2) "Present Status of Intravenous Anaesthesia"; to the Western Division of the C.A.S. at Saskatoon, Saskatchewan, "Mechanical Ventilators in Anaesthesia." Dr. C. P. W. Lunderville spoke to the Annual Meeting of the Canadian Anaesthetists' Society at the Seignior Club, on "A Clinical Comparison of Three Analgesic Drugs," to the Section of Anaesthesia of the Ontario Medical Association, on "The Anaesthetic Management of the Toxaemic Patient." Dr. S. L. Vandewater spoke to the Electro-Encephalographic Society meeting in Toronto on "Further Observations in Hypothermia for Neurosurgery"; to the Ontario Division of the C.A.S. and the Section of Anaesthesia of the Ontario Medical Association in London, Ontario, on "The Use and Misuse of Vasopressor Agents"; to the Houston Neurosurgical Society, Houston, Texas, on "The Use of Hypotension and Hypothermia in Subarachnoid Haemorrhage."

RESEARCH

Members of the staff have undertaken the following research work:

Dr. G. D. M. Boddington, in association with Dr. J. L. Harkins of the Department of Obstetrics, at the Toronto General Hospital, has been carrying out a clinical investigation on the possible value of the use of an antagonist to the respiratory depression of opiates used in alleviating the pain of first-stage labour, so that there will not be depressed or delayed breathing in the newborn infant.

Dr. R. A. Gordon and Dr. C. P. Lunderville, at the Toronto General Hospital, have carried out a clinical comparison on over a thousand postoperative patients of three analgesic drugs, meperidine, leritine, and morphia.

Dr. S. L. Vandewater, in conjunction with Dr. W. M. Paul of the Department of Obstetrics, finished a project commenced last year on observations on the circulation of the foetal lamb during hypothermia. The findings in this investigation clarify some problems arising in the use of hypothermia in the surgical treatment of intracranial aneurysms in the pregnant woman. Dr. S. L. Vandewater also investigated, observed and tabulated the occurrence of hypotension during the immediate post-operative period in 1,340 patients.

Dr. J. A. Vining at St. Michael's Hospital is carrying out a clinical evaluation of the transaminase values obtained in post-anaesthetic patients as an index of possible liver damage, with particular reference to the agent halothane.

PUBLICATIONS

DIXON, G. D. and MATHESON, D. J. "Fluothane and Other Non-Explosive Halogenated Hydrocarbons in Clinical Anaesthesia" (*Canadian Medical Association Journal*, vol. 79, Sept. 1, 1958, pp. 365-70).

FLEMING, SHIRLEY and CAMPBELL, S. M. "Epidural Anaesthesia in Obstetrics" (*Current Researches in Anaesthesia and Analgesia*, vol. 38, no. 2, March-April, 1959, pp. 133-7).

MACKAY, IAIN M. and KALOW, W. "A Clinical and Laboratory Evaluation of Four Fluothane Vaporizers" (*Canadian Anaesthetists' Society Journal*, vol. 5, no. 3, July, 1958, pp. 248-61).

MARSHALL, B. M. and GORDON, R. A. "Vomiting, Regurgitation and Aspiration in Anaesthesia" (*Canadian Anaesthetists' Society Journal*, vol. 5, no. 3, July, 1958, pp. 274-8; vol. 5, no. 4, Oct., 1958, pp. 438-45).

ANATOMY

Under the direction of Professor J. W. A. Duckworth

During the year 1958-9 there were 791 undergraduate and graduate students working in the Department of Anatomy. They were distributed among 31 different courses mentioned below, as follows:

UNDERGRADUATE COURSES IN GROSS ANATOMY AND NEURO-ANATOMY		
1. Medical, first year	161	
Art as Applied to Medicine	2	
Teachers' Course, Physical and Occupational Therapy	1	
2. Dental, first year	91	
3. Physical Anthropology	90	
4. Physical and Occupational Therapy, first year	61	
5. Physical and Occupational Therapy, second year	56	
6. Physical and Occupational Therapy, third year	56	
7. Physical and Health Education, second year	41	
8. Physical and Health Education, third year	38	
9. School of Embalming, first year	37	
10. School of Embalming, second year	33	
11. Dental Hygiene, first year	5	
12. Speech Pathology	8	
	—	680
GRADUATE COURSES IN GROSS ANATOMY		
13. Surgery	12	
14. Radiology	14	
15. Anaesthesia	9	
16. Neuro-anatomy	7	
17. Ophthalmology	6	
18. Oto-laryngology	9	
19. Dental Anatomy	4	
20. Physical Anthropology	1	
21. Demonstrators in Gross Anatomy	3	
22. Advanced Graduate Course in Surgery	18	
23. Advanced Graduate Course in Obstetrics and Gynaecology (Summer)	13	
24. School of Graduate Studies	1	
	—	97
UNDERGRADUATE COURSES IN HISTOLOGY		
25. Medical, first year (included in item 1)	164	
26. Dental, first year (included in item 2)	91	
27. Physical and Occupational Therapy, first year (included in item 4)	61	
GRADUATE COURSES IN HISTOLOGY AND CYTOLOGY		
28. Graduate Dental Histology	4	
29. Graduate Histology	6	
30. Demonstrator in Histology	1	
31. Special Cytology	3	
	—	14
		791

During the year 1958-9, one additional course was given by the Department. This course consisted of thirty lecture-demonstrations in anatomy to students taking the newly established course leading to a Diploma in Speech Pathology and Audiology.

As an experiment, in the first medical year each student was required to pass an oral examination, on each of the five principal regions of the body. These examinations were carried out on the student's own dissections and ensured that the student had actually seen the structures and had not memorized them from the book.

As a result of the receipt of a major equipment grant from the National Research Council the Department has been able to purchase and instal a Philips Model 100B electron microscope. This instrument will be under the charge of Dr. T. S. Leeson and will be used both by him and by the Department of Microbiology in their research and teaching programmes.

The Physical Anthropology and Comparative Anatomy section of the Department has been enlarged, in order to provide more efficient instruction to the increasing number of premedical and anthropology students making use of this course.

In August, 1958, Dr. D. L. J. Bilbey joined the staff of the Department, from King's College Medical School, London. Dr. Bilbey graduated from London University in 1953 and obtained his Ph.D. degree in 1958. His major field of research is the reticulo-endothelial system.

In December, 1958, Dr. T. Nicol, Professor of Anatomy and Dean of King's College Medical School, London, visited the Department and gave two addresses on the results of his researches into the function and activity of the reticulo-endothelial system.

In March, 1959, Dr. J. E. Anderson delivered a paper to the Toronto Dental Research Association on "The Medico-Legal Study of the Skeleton" and in June he also gave a paper to the Canadian Federation of Biological Sciences on "Extrinsic Obstruction of the Vertebral Artery."

In May, Dr. D. L. J. Bilbey gave two addresses to the Biochemical and Biophysical Society of Toronto, of which the first was entitled "An Introduction to the Reticulo-Endothelial System," and the second "Further Investigations into the Activity of the Reticulo-Endothelial System."

In June, Dr. J. W. A. Duckworth gave a paper to the Canadian Federation of Biological Sciences on "The Development of the Sinu-atrial and Atrioventricular Nodes of the Human Heart with Special Reference to the Changes Occurring after Birth." In the same month, he also gave two addresses to the Association of Medical Librarians on "Medical Terminology."

Dr. T. S. Leeson gave a paper in June to the Canadian Federation of Biological Sciences on "The Fine Structure of Embryonic and Foetal Glomeruli."

Dr. C. G. Smith read a paper in June to the Canadian Federation of Biological Sciences, entitled "A Dissection of an Unusually Large Vein Draining the Core of the Cerebellum."

In the same month Dr. G. G. Forstner read a paper to the Canadian Federation of Biological Sciences on "The Vascular Anatomy of the Liver."

RESEARCH

Dr. J. E. Anderson has been engaged in the following specific programme: examination of the skeletons from the Bradford Indian burial site excavated by the University of Toronto in the fall of 1958; with Donald R. Gratton, a study of age changes within teeth (a method has been developed to determine age of individuals by microscopic examination of tooth sections; this project was supported by a grant from the Canadian Dental Association); with Arnold Noyek, a study of the distal femoral epiphysis in vertebrates; with Neil McPhail, a Lederle Fellow, preliminary work on a direct method for determining the blood types in specimens of bone.

Dr. S. H. Bensley, using normal mice and mice with congenital muscular dys-

trophy, has carried out microscopic studies of inflammatory reactions in the connective tissue of the iris and the effects of various agents on the inflammatory processes. This work was partly supported by a grant from the Banting Research Foundation.

In collaboration with Dr. F. George Walker of the Hospital for Sick Children, a histological study has been made of the effects of standard trauma on tendon and epi-tendon tissues and of the effects of Phenergan, in varying doses, on the repair of traumatized tendons. It was found that Phenergan in toxic doses prolongs the degenerative and inflammatory responses of tendons to standard trauma and thus interferes with repair; but in sub-toxic doses, it delays the inflammatory and proliferative reactions of traumatized tendons and thus favours repair and reduces the formation of adhesions. The specific mode of action of Phenergan on the connective tissues is being investigated further.

In collaboration with Dr. William Spaulding of the Toronto General Hospital, studies of the blood cells of male patients with hereditary episodic oedema were undertaken. It was found that nuclear extensions in the polymorphonuclear leucocytes were significantly increased over those in similar cells of normal male blood. The significance of this finding is being further investigated.

Dr. Michael Hall, under the direction of Dr. Bensley, has made comparative measurements of the water-binding capacity of common connective tissue. It was found that this property of connective tissue was affected by pressure, pH, temperature, age, and by certain metabolites, antimetabolites, hormones, enzymes, vitamins and minerals.

Dr. D. L. J. Bilbey has carried out investigations into the influence of various toxins and antitoxins on the macrophage system. No demonstrable modification of the system has been found over short periods of time. He has also investigated the effect of atmospheric pollutants on the reticulo-endothelial system as a whole and on the lung macrophage component in particular. These studies have been carried out with Dr. E. A. Sellers and Dr. H. Salem of the Department of Pharmacology. The results of these studies have been submitted to *Nature* in the form of a paper entitled: "Influence of Sulphur Dioxide Inhalation on the Macrophage System."

Dr. G. G. Forstner, under the direction of Dr. Bilbey, has investigated the circulatory pathways of the liver in association with surgical procedures. Animal and human liver circulatory pathways have been studied following the injection of vinylite. As a result of these studies a fresh nomenclature for the circulatory tree of the liver is being put forward.

Dr. W. P. Bobechko, under the direction of Dr. W. R. Harris, has investigated changes in the density of bone in avascular necrosis. The femoral heads in rabbits were rendered avascular by producing a fracture of the neck and cutting through the ligament of the head. As a result of the changes occurring following this operation, Dr. Bobechko concluded that: (1) avascularly necrotic bone as such was not denser than normal bone as shown in the other femur; (2) no significant degree of osteoporosis of surrounding normal bone occurred; (3) the progressive increase in radiological density of a fragment of avascular bone paralleled the ingrowth of new bone by the encapsulation process; (4) the term "creeping substitution" was incorrect. Dead bone was not first resorbed and then new bone formed. New bone frequently encapsulated dead bone without any previous resorption. The experiments did not last over a sufficient length of time to determine the ultimate fate of the encapsulated fragments of dead bone.

In addition to continuing his research into the developmental changes occurring in the specialized conducting tissue of human heart, Dr. J. W. A. Duckworth has been investigating the development of congenital cardiac abnormalities, especially those concerned with malrotation of the cardiac loop and transposition of the great vessels.

Dr. T. S. Leeson continued his electron microscopic investigations of the rabbit mesonephros and metanephros. The results of these investigations were presented as his thesis for the degree of M.D. (Cantab.) which he was awarded in April, 1959. He has also carried out electron microscopic investigations on (1) the post-natal

development of the rabbit kidney, and (2) the electron microscopic appearance of mummified material. He is at present carrying out electron microscopic and histochemical studies on the developing trachea.

Dr. C. G. Smith has been carrying out investigations into the venous drainage of the cerebellum with special reference to the visualization of these veins in the venous phase of arteriograms.

PUBLICATIONS

BENSLEY, S. H. "Liver Tumor Cells Implanted in the Anterior Chamber of the Eye" (*Acta Hepato-Splenologica*, vol. 6, no. 1, March, 1959, pp. 48-9).

———"The Scope and Limitations of Histochemistry" (*American Journal of Medical Technology*, vol. 25, Jan.-Feb., 1959, pp. 15-32).

BILBEY, D. L. J. "Effect of Various Natural Steroids on the Phagocytic Activity of the Reticulo-endothelial System" (*Nature*, vol. 182, Sept., 1958, p. 674).

GRANT, J. C. B. *A Method of Anatomy*. Sixth edition. Baltimore: Williams and Wilkins. 1958. Pp. 879.

ART AS APPLIED TO MEDICINE

Under the direction of Miss Maria T. Wishart

There were two students in the course, both in their first year. Our graduates are in demand, and the nature of the opportunities offered them shows recognition of the quality of their training and the value of the course. Two recent appointments were to the Department of Ophthalmology, Tulane University, New Orleans, and Westminster Medical School, London, England.

The number of individual staff members using the service offered by this Department has grown well over 100 per cent in a five-year period. It follows that the number of requests for assistance has correspondingly grown. Although the size of the staff has not been increased during this period, yet the greater output required to meet the demand has been achieved. This growth in output is due to the close co-ordination of the over-all work of the Department, the team work of the staff, secretaries as well as illustrators, and the drive with which the work is approached and undertaken.

In October, Miss M. T. Wishart as a member of the sub-committee, Council on Education, Association of Medical Illustrators, attended a meeting in Chicago with Dr. Edward L. Turner, Chairman of the Council on Education, American Medical Association.

To mention a few of the subjects illustrated during the past year:

Miss Elizabeth Blackstock, "The Role of Heat and Light Rays in the Production of Cataract by the Atomic Bomb," for Dr. C. McCulloch, Ophthalmology; "Disorders of the Macula," for Dr. A. J. Elliot, Ophthalmology; "Structure of the Glomerulus in Membranous Glomerulo-nephritis," for Dr. H. Z. Movat, Pathology; "Horner's Syndrome," for Dr. O. H. Warwick, Medicine.

Mrs. Mary Murphy: Cover design, *Canadian Medical Association Journal*, for Drs. Gilder and Dufresne, Canadian Medical Association; "Effects of Estrogen on 17-hydroxycorticoids," for Dr. J. C. Laidlaw, Medicine; "A Final Evaluation of Adrenalectomy," for Dr. N. C. Delarue, Surgery; "Observations of the Foetal Lamb *in utero* during Hypothermia," for Drs. Vandewater and W. M. Paul, Anaesthesia and Obstetrics and Gynaecology, "Great Vessel Aneurysms," for Dr. J. A. Key, Surgery.

A noticeable interest in exhibits is being displayed. Illustrations, headings and blocks of lettering as required were carried out for quite a number, and in two instances, Miss Wishart, Miss Blackstock and Mrs. Murphy planned and designed the exhibits in their entirety. This is a preliminary but all important step as the material should be presented in as expert a manner as possible. One of these, an exhi-

bit on "The Neurosurgical Relief of Pain" displayed at the College of General Practice of Canada, is also being shown in Edinburgh at the meeting of the Canadian Medical Association in July.

BACTERIOLOGY

Under the direction of Professor Philip Greey

Early in 1959 the space occupied by the routine clinical bacteriology of the Toronto General Hospital was vacated when this division moved to the thirteenth floor of the hospital's new central building. The three rooms thus freed have been entirely redecorated with vinyl tile flooring and formica bench tops and equipped with modern fluorescent lighting. One laboratory is used by Dr. A. E. Franklin, who has moved from cramped quarters in the sub-basement of the Best Institute. The others have been loaned to the Department of Ophthalmology for research purposes.

RESEARCH

Dr. R. M. Price is continuing her interest in the prophylactic vaccination against tuberculosis and skin testing for detection of the total tuberculous allergy.

Dr. G. H. Hawks, at St. Michael's Hospital, is continuing a study of anti-streptolysin titres in people with rheumatic fever and has investigated the latex agglutination test in rheumatoid arthritis.

Dr. T. E. Roy, Hospital for Sick Children, has completed a serological investigation utilizing extracts of staphylococci. He is conducting an extremely detailed survey of all infections developing in patients in hospital.

The study of cat scratch disease continues in co-operation with Dr. W. B. Spaulding, Department of Medicine. A paper describing the 83 cases diagnosed in the past four years has been prepared for publication. Miss J. M. Hennessy is endeavouring to isolate the causative agent by tissue culture techniques and has obtained some results suggestive of virus multiplication.

Dr. A. E. Franklin has continued studies on the isolation of the agent of infectious hepatitis using several lines of human cells in tissue culture. The addition of hormones to growth media has been used in an attempt to sensitize cells to this virus, but the results so far have been negative. The effect of prednisolone has been observed in cultures infected with representative strains of enteroviruses. Small, but consistent, increased sensitivities have been noted with poliovirus, type 1, and Coxsackie B5 viruses. ECHO-9 virus has been adapted to growth in HeLa cells, and the adaptation of Coxsackie A9 is now in progress. The effect of prednisolone on viral adaptation is also being studied. Some virus isolation studies have been attempted in co-operation with the Toronto General Hospital from cases of pericarditis, aseptic meningitis and paralytic disease. Three strains of Coxsackie B5 virus and one strain of poliovirus, type 1, have been isolated.

Dr. J. C. Sinclair and his group have continued their studies on the isolation of the agents of infectious hepatitis and serum hepatitis. Drs. J. C. Sinclair and Marjorie Swanson have studied outbreaks of infectious hepatitis in the Kenora-Kee-watin area, Sudbury, Fort William Sanatorium, and the Regent Park District of Toronto. A further follow-up survey of the Elliot Lake District was carried out at the end of April. Miss B. K. Buchner, assisted by Miss Snyder, while investigating various hemagglutination procedures, showed that approximately 50 per cent of sera from cases of acute infectious hepatitis gave rise to the agglutination of Rhesus red cells. Such hemagglutination, however, was non-specific and probably due to a cold agglutinin. Infection experiments, after production of so-called giant cells by irradiation of Henle's intestinal cell line, yielded negative results. A study of the sera from various types of liver disease has been undertaken to determine the level of

complement-fixing antibody when normal human tissue (e.g., liver, spleen, kidney) is used as antigen (after the method of Gajdusek). The fluorescent antibody technique is presently being applied to the study of a control system, using the PR8 strain of influenza virus in the chick embryo prior to its application to the hepatitis problem.

PUBLICATIONS

GREEY, P. H. Review, *Canadian Medical Association Journal*, vol. 80, no. 4, Feb. 15, 1959, p. 319.
GREEY, P. H. and WIGHTMAN, K. J. R. "Kanamycin: Experience in Selected Cases" (*Annals of the New York Academy of Sciences*, vol. 76, Sept. 30, 1958, pp. 224-7).
ROY, T. E. *et al.* "The Latex Agglutination Test with Extracts of Staphylococci" (*Canadian Journal of Public Health*, vol. 50, no. 1, Jan., 1959, p. 30).
SINCLAIR, J. C. Review, *Canadian Medical Association Journal*, vol. 80, no. 9, May 1, 1959, p. 762.

BIOCHEMISTRY

Under the direction of Professor A. M. Wynne

During the past year 331 students received instruction in the Department:

Faculty of Medicine, first medical year	153
Faculty of Dentistry, second dental year	70
Faculty of Arts, third and fourth years, honour courses	26
Faculty of Household Science	10
Graduates enrolled as "special students"	19
Graduates enrolled in the School of Graduate Studies	53
(a) Major subject Biochemistry	22
Candidates for Ph.D.	11
Candidates for M.A.	8
Not yet enrolled for higher degree	3
(b) From other departments	31
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	TOTAL 331
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Apart from the supervision of research, responsibility for instruction was distributed among members of the staff as follows: Medical students: lectures by Professor A. M. Wynne, supervision of laboratory work by Professor J. M. Fisher; Dental and Household Science students: lectures and supervision of laboratory work by Professor G. E. Connell; Honour Arts students, third year: lectures and supervision of laboratory work by Professor B. F. Crocker; Honour Arts students, fourth year, and graduate students: about twenty-five lectures by Professor Fisher, the others shared by Dr. M. A. Packham and Professors Connell, Crocker and C. S. Hanes; advanced laboratory course supervised by Professors Fisher and Connell assisted by Dr. Packham; special work of student in Biochemistry Option of Physics and Biochemistry course, supervised by Professor Hanes; Graduate students: advanced lectures on enzymes by Professor Hanes.

The Department collaborated again in June, 1959, in a short course for medical graduates on clinical uses of radio-isotopes, organized by the Division of Postgraduate Medical Education. Dr. Marian Packham and Professor G. C. Butler were again among the instructors, and the laboratory facilities of the Department were used for some of the experimental work.

Visitors to the department included Dr. Stanford Moore of the Rockefeller Institute for Medical Research, New York, and Dr. Thomas S. Work of the National Institute for Medical Research, Mill Hill, London, England, both of whom delivered lectures on topics related to the special fields of research in which they are working.

On the invitation of the Royal Society of Canada, Professor Crocker contributed one of the five papers presented in a Special Symposium on Evolution at the annual meeting of the Society in Saskatoon in June, 1959.

Members of the Department have again received generous grants in aid of research from the National Cancer Institute of Canada, the National Research Council of Canada and the University's Advisory Committee on Scientific Research. Support in the form of scholarships awarded by the first two of these bodies has been received by several of the graduate students working in the Department.

RESEARCH

Five graduate students have worked with Professor C. S. Hanes on a range of problems. Mr. C. K. Harris continued his work on the new group of peptide-like compounds which he discovered to be present in relatively large amounts in Ehrlich ascites tumour cells. Mr. K. A. Walsh completed an extensive theoretical treatment of the kinetics of enzymic transfer reactions; application to the case of the sucrose phosphorylase pointed to the formation of a glucosylated enzyme intermediate as the most probable mechanism of action of this enzyme. Dr. M. A. Moscarello continued to study two aspects of the Ehrlich ascites tumour cells: namely, the effects of physical and chemical treatments upon the capacity of the cells to propagate the tumour; and the content of soluble nucleotides in these cells. Mr. T. E. Webb has studied further the γ -glutamyl transpeptidase of kidney and has achieved a considerable degree of purification of the enzyme; he has studied also a second kidney enzyme, leucyl-glycinase, which previous work in this laboratory had shown to exist as a ribonucleoprotein-metal complex. Miss E. H. M. Wade concluded her work on the development of improved chromatographic methods for the estimation of the amino acids in protein-hydrolysates.

Of four remaining graduate students who began their work under the direction of Professor G. C. Butler before he left the Department, two students, Mr. J. M. Neelin and Miss Renata Diringer, have completed their work for the Ph.D. degree and the other two, Mr. K. B. Freeman and Mr. B. G. Lane, are in the final stages of their work. During the past year Miss Diringer carried out some interesting studies on the pattern of labelling of the pyrimidines of the polynucleotide chains in both ribonucleic acid (RNA) and deoxyribonucleic acid (DNA) synthesized by *Escherichia coli* in culture media to which uracil- C^{14} was added at an appropriate time in the life-cycle of the organism. The results of this work have a bearing on theories of the biosynthesis of nucleic acids, as have also the results of recent studies carried out by Mr. Freeman on the incorporation of inorganic phosphate labelled with P^{32} into the RNA of *E. coli*. Four mononucleotides, after their release from combination in RNA and after separation in pure form, were found to exhibit different specific activities. Mr. Lane has continued his investigation of compounds found in alkaline hydrolysates of RNA, which are not mononucleotides. Five of these compounds have been characterized as dinucleotides of known structure. Four others are believed to be methylated dinucleotides. Dr. Butler has found it possible to visit the Department several times during the past year to discuss research problems with these graduate students. Mr. J. M. Neelin completed his studies of nuclear histones early in the academic session.

In Professor B. F. Crocker's laboratory, Mr. F. M. Kahan concluded his study of factors regulating the rate of entrance of galactosides into *E. coli* cells. His experimental work was based on an extensive theoretical analysis of the predicted relation between substrate concentration outside a permeability barrier and the activity of an enzyme inside the barrier. Mr. Kahan has obtained further information about the enzymic mechanism that transports galactosides into the *E. coli* cell. Mrs. Helen Morton-Coval, on leave of absence from the Laboratory of Hygiene, Department of National Health and Welfare, Ottawa, concluded a study of the formation of β -galactosidase and of nitrate reductase by *E. coli* cells in the complete absence of inducing substances external to the cells. The conditions under which each enzyme was formed at maximum rate were systematically investigated. Dr. Albert Hercz began his research under Dr. Crocker's direction in May, 1959.

The investigation of electrolyte movements and of metabolic processes in biological systems has continued in Professor J. Manery Fisher's laboratory, and new researches have been initiated. With the assistance of Mrs. E. Dryden, Dr. Fisher has pursued further her studies on the stimulation by insulin of the movement of sodium, potassium and chloride in isolated frog muscle and on the uptake of oxygen, lactate and inorganic phosphate in this tissue under various experimental conditions. Miss A. Hasner has observed that insulin causes a decrease in the extracellular space of isolated frog muscle, as indicated by the results of experiments involving inulin and chloride analyses. Other problems investigated by Miss Hasner included that of the stimulation of the oxygen consumption of frog muscle by nitrate and the apparent inhibition by insulin of this stimulation. Mr. G. J. Marcus has continued the study of muscle mitochondria. He has investigated the relation between oxidative phosphorylation and the accumulation of potassium in these structures, and he has developed a new method for the estimation of the extraparticulate space in the mitochondrial pellet prepared by methods involving differential centrifugation. Mr. Yusef Ma'tuk has undertaken a study of cation movement in the lens of the eye, with particular attention in the beginning to the movement of potassium into and out of the lens, as affected by changes in temperature and by the presence of glucose. Miss Helen Mayoh has been engaged in studies of certain phosphatases found in the liver and in the skeletal muscle of the frog and she has compared the activities of these enzymes with those of similar enzymes in the corresponding tissues of the rat. She has also examined by chromatographic methods the nature of the carbohydrate normally present in frog blood.

Professor G. E. Connell has continued the study of serum haptoglobins. He has prepared highly purified samples of five different genetic types of human haptoglobin; and in collaboration with Dr. O. Smithies of the Connaught Medical Research Laboratories, he is investigating chemical and physical differences among these types. Two graduate students are working under Dr. Connell's direction: Mr. R. W. Shaw has begun a study of the chemical interaction between haemoglobin and haptoglobin; and Dr. R. K. Murray has been engaged in a study of the catabolism of haemoglobin in experimental animals, with special attention to possible effects of haptoglobin on this process.

Graduate students have completed the following theses:

For the M.A. degree:

CRASTON, Mrs. ANN ROBERTSON. Electrolyte studies in mitochondria.

MORTON-COVAL, Mrs. HELEN. A study of the formation of enzymes by *Escherichia coli* B in the absence of external inducers.

KAHAN, FRED M. The permeability barrier to galactosides in *Escherichia coli*.

WADE, Miss ELIZABETH H. M. Quantitative chromatography of the amino acids in proteins and polypeptides.

For the Ph.D. degree:

DIRINGER, Miss RENATA. Chemical and metabolic studies of nucleic acids.

HARRIS, CLIFFORD K. Enzymic studies relating to the problem of protein synthesis.

MICHENER, Miss DIANA M. L. Further aspects of the biosynthesis of enzymes.

NEELIN, JAMES M. Physical and chemical studies of nuclear proteins.

WALSH, KENNETH A. Mechanisms of enzyme transfer reactions.

PUBLICATIONS

CONNELL, G. E. and SMITHIES, O. "Human Haptoglobins: Estimation and Purification" (*Biochemical Journal*, vol. 72, no. 1, May, 1959, pp. 115-21).

CONNELL, G. E. *et al.* "Incorporation of Amino Acids into Protein of *Azotobacter* Cell Fractions" (*Biochimica et Biophysica Acta*, vol. 31, no. 2, Feb., 1959, pp. 391-7).

CONNELL, G. E. *et al.* "Incorporation of C¹⁴ into Bacterial Peptides" (*Canadian Journal of Microbiology*, vol. 4, no. 6, Dec., 1958, pp. 633-48).

LANE, B. G. and BUTLER, G. C. "The Exceptional Resistance of Certain Oligonucleotides to Alkaline Degradation" (*Biochimica et Biophysica Acta*, vol. 33, no. 1, May, 1959, pp. 281-3).

- MATHESON, A. T. and HANES, C. S. "The Chemical Nature of Intracellular Peptides" (*Biochimica et Biophysica Acta*, vol. 33, no. 1, May, 1959, pp. 292-3).
- MOTZOK, I. "Studies on Alkaline Phosphatases: 1, Kinetics of Plasma Phosphatase of Normal and Rachitic Chicks" (*Biochemical Journal*, vol. 72, no. 1, May, 1959, pp. 169-77).
- NEELIN, J. M. and CONNELL, G. E. "Zone Electrophoresis of Chicken Erythrocyte Histone in Starch Gel" (*Biochimica et Biophysica Acta*, vol. 31, no. 2, Feb., 1959, pp. 539-41).

COMMITTEE ON EXPERIMENTAL RESEARCH

Chairman: Professor J. D. Hamilton
Supervisor: Dr. R. C. Ritchie

Mr. Walter Cowan retired on June 30 of this year after nearly forty years of service with the University. During that time he had assisted with experimental surgery and been in charge of the animal operating room. The occasion of his retirement was marked by a tea in the Library of the Department of Pathology, and the presentation of a purse contributed by those who had worked with him. It is a pleasure to report that the number of those at the tea, as well as the number contributing to the purse, gave ample proof of the high esteem in which Walter Cowan is held by his associates.

Efforts have continued at trying to find some way of establishing a kennel outside the city where dogs may be conditioned before being used for experimental purposes, and where survival dogs may be kept under optimum conditions. The University has received a gift to permit a survey of animal farms in other university centres to determine the best means of providing and maintaining animals for experimental purposes.

Major changes have been instituted again this year with the removal of the recovery room from the fifth floor, and the conversion of a room in the animal quarters for this purpose. Space is much needed not only for dogs but especially at this point for small animals, as more and more research is being undertaken in the Institute by nearly all the departments.

Repairs to the building have continued, with the installation of a concrete floor on the west side, together with coating of all the walls with plastic paint which, it is hoped, will reduce the problem of insects.

Again I should like to pay tribute to Dr. Ritchie and his staff for their willingness to provide the best of service, often under very trying conditions.

MEDICAL BIOPHYSICS

Under the direction of Professor A. W. Ham

The Department of Medical Biophysics was established in the Faculty of Medicine as of July 1, 1958. A submission for a graduate department in the School of Graduate Studies was made immediately and was granted. Eight graduate students were enrolled and have been working during the past session toward degrees. The Department now offers six courses at the graduate level; three were given during the past session.

It is expected that the part that the Department will play in providing instruction to premedical and medical undergraduates on various aspects of radiation and radiation medicine will become defined over the next few years. In the meantime the content of what is believed to be a suitable course on this subject is being assembled and this should serve as a basis for deciding how, where and when the instruction should be provided.

At the postgraduate level, members of the Department participate in teaching

parts of the Diploma Course in Therapeutic Radiology and plans are being made to broaden the basis of instruction on the biological effects of radiation available for postgraduate students.

By means of cross appointments many members of the staff participated in the teaching courses presently being given to medical and other students in other departments.

Members of the staff delivered lectures to various scientific societies and groups throughout the year.

Professor A. A. Axelrad, by invitation, delivered a lecture on "The Induction of Tumors in Mice and Hamsters by a Cytopathogenic Virus," at Roswell Park Memorial Institute, Buffalo, N.Y. He also presented a paper to the American Association for Cancer Research at Atlantic City.

Professor B. Cinader, by invitation, delivered two lectures on immunochemistry, one at the University of Buffalo, and the other at the University of Illinois.

Dr. C. R. Fuerst presented a paper on "The Inactivation of Bacterial Virus by Physical Means" to the New York Academy of Sciences in New York City.

Professor E. S. Goranson, in collaboration with Dr. McCulloch, presented a paper on "Serum Protein Alteration after Total Body Irradiation in C3H_f Mice" to the American Physiological Society at Atlantic City.

Professor A. W. Ham was guest lecturer at the Western Regional Meeting sponsored by the National Research Council at Banff. He discussed the present status of virus in the immunology of cancer.

Professor C. W. Helleiner presented a paper on "The Synthesis of Arginine by Mouse Cells (L-strain)" to the Canadian Federation of Biological Sciences at Toronto.

Professor A. F. Howatson was a guest speaker at the 11th Annual MidWest Cancer Conference at Wichita, Kansas, and gave two lectures, one on "Ultramicroscopic Cell Structure and Its Relation to the Study of Cancer," and the other on "Ultramicroscopic Study of Viruses and Their Possible Relationship to Cancer."

Dr. J. W. Hunt, in collaboration with W. B. Sampson, presented a paper on "An Electron Spin Resonance Spectrometer for Radiation and Biological Studies" to the Royal Society of Canada, Physics Section, in Saskatoon.

Professor H. E. Johns delivered a lecture on "The Spectral Distribution of Scattered Radiation Produced in a Water Phantom by X-rays in the Range 100 kv to 1.25 Mev.," at the International Congress of Radiation Research, at Burlington, Vermont. He also presented a paper to the Seminar on Isotope Scanning, at the International Atomic Energy Agency at Vienna, on "Basic Principles of Scintillation Counting." In addition, he presented a Seminar on "Physical Principles of Teleisotope Therapy" at the University of Wisconsin, Madison, Wisconsin.

Dr. E. A. McCulloch delivered a paper to the Virus Section of the American Association for Cancer Research at Atlantic City on "Tumor Induction in Swiss Mice by Virus Obtained Originally from a Mammary Tumor in a C3H Mouse and Cultivated *in vitro*." He also participated in the Canadian Medical Association Cancer Education Programme conducted by the Division of Postgraduate Studies at the University of Dalhousie; this included lectures to three local groups in different centres in Nova Scotia and a talk to the Undergraduate Medical Students of the University in Halifax.

Professor Louis Siminovitch, by invitation, delivered a lecture in the Department of Microbiology, School of Medicine, University of Pittsburgh, and another at the Department of Agriculture in Ottawa, and he and Professor Axelrad, by invitation, presented a paper to a Symposium at the Canadian Federation Meetings in Toronto.

Professor J. E. Till presented a paper on "The Cell Cycle of Mouse Cells in Tissue Culture" to the American Biophysical Society in Pittsburgh; and in collaboration with Dr. McCulloch delivered a paper on "The Radiation Sensitivity of Mouse Bone Marrow Cells" to the Radiation Research Society of the United States at Pittsburgh.

Professor G. F. Whitmore, with Professor J. E. Till, delivered a paper on "Some Effects of X-rays on Mammalian Cells in Tissue Culture," to the American Biophysical Society in Pittsburgh. He was an invited speaker at the Symposium held on Radiation by the Canadian Federation of Biological Societies. He also delivered a paper on "Bacteriological Methods in Tissue Culture" to the Canadian Association of Microbiologists, and one on "Some Effects of X-rays on Mammalian Cells" to the International Congress of Radiation Research held at Burlington, Vermont.

RESEARCH

The research described briefly below is supported primarily by the Ontario Cancer Treatment and Research Foundation and by a large grant from the National Cancer Institute of Canada. Subsidiary assistance is received from the Banting Research Foundation, Defence Research Board of Canada, Foster Bequest Fund of the University of Toronto, National Institutes of Health, United States, National Research Council of Canada, by means of grants made to various individuals on the Staff.

Much of the research involves collaboration between members of the senior staff. In particular, Professors Axelrad, Ham, Howatson, McCulloch and Siminovitch have worked closely together and made extensive studies with a virus recovered by Dr. McCulloch from a mouse mammary tumour and cultivated serially by him in cell cultures. When given to newborn Swiss mice, the virus preparations induce parotid and mammary tumours and lymphomas, and when given to newborn hamsters, kidney and heart sarcomas. Kidney tumours develop so quickly, animals often die in less than two weeks. This exceedingly rapid induction of a mammalian tumour has permitted the histopathological sequence in virus-induced carcinogenesis to be determined. The virus is a good antigen and immunological studies with it are under way.

Other collaborative studies will be mentioned along with the individual reports, which follow:

In Professor A. A. Axelrad's group, Mr. J. Wong found chromosomal abnormalities in the leukaemic cells of mice that have leukaemogenic virus; these could be either the cause of the leukaemic behaviour of the cells or a result of cells harbouring a virus primarily responsible for their neoplastic behaviour. Since the tumour virus isolated here induces tumours so quickly, Miss J. F. Roseborough is studying the chromosomes of these to see if abnormalities appear simultaneously with neoplastic behaviour, or only later after neoplastic growth has continued for some time.

The virulence of the gross leukaemia virus is enhanced with serial passage in newborn mice. Mr. H. VanderGaag, with Professor Axelrad, is determining how leukaemic cells induced with the original virus compare with regard to their transplantation behaviour with leukaemic cells induced with the serially transferred virus of enhanced virulence. Experiments are also under way to determine the minimum number of cells from a spontaneous mouse-mammary tumour that are necessary to start a tumour transplant in its original host as compared with the number required to start a tumour in isologous mice. This study should yield information as to whether an animal with a spontaneous tumour develops any immune reaction against it.

Miss J. Evans and Professor Axelrad have studied mutations in L-cells. They have transplanted L-cells from cultures into adult C3H mice and only a few tumours developed. By taking cells from those that did grow, they obtained cells that, from a smaller inoculum, would grow in a much larger proportion of adult mice and kill their hosts sooner. These cells retain these properties after re-culture *in vitro*. Professor Siminovitch collaborated in this work. With the collaboration of Professor Cinader, immunochemical comparisons are being made between the highly virulent cells and their cells of origin.

Dr. I. M. Cass, working with Professor Ham, has shown that injecting antigen into foetuses does not incite the formation of mature plasma cells as occurs in post-natal life after the period when tolerance can be induced.

In Dr. Cinader's group, the main lines of research have been concerned with: (1) acquired immunological tolerance to purified proteins; (2) the effect of antibodies on mammalian cells in tissue culture; (3) antibodies to enzymes; and (4) attempts to induce antibody synthesis in cells cultured *in vitro*, as will now be described.

Mr. B. G. Carter has studied acquired immunological tolerance in goats and, in particular, the nature of partially induced tolerance to decide whether or not the antibody under these conditions is changed.

Mr. M. Gold is attempting the fractionation of antibody on diethylaminoethyl-cellulose with a view to comparing the distribution of antibody in immune and in partially tolerant animals.

Dr. M. Branster and Professor Cinader are investigating the interaction between ribonuclease and its antibody. The kinetics of the inhibition of the enzyme are being studied by paper chromatography.

Dr. I. Riha and Professor Cinader are attempting to produce antibody in tissue culture on the assumption that two cell types participate in the phenomenon. In collaboration with Professor Siminovitch, Professor Cinader has made antibody to L-cells and to giant cells resulting from radiation, and has found that these cells in tissue culture are killed by the antibody but only in the presence of complement.

Professor E. S. Goranson in collaboration with Dr. J. W. Hunt is exploring various ways and means of altering the metabolic states of a tumour-bearing host to determine whether radiation of the tumour is more effective under the altered conditions. In collaboration with Dr. McCulloch and Mr. E. Cinits, Professor Goranson has shown that the sera of mice exposed to lethal doses of radiation reveal a marked abnormality in an alpha globulin fraction when analysed by starch gel electrophoresis. The abnormality persists in animals that received supra-lethal radiation but are protected with isologous marrow transplants.

With Dr. A. Hercz and Mr. E. Cinits, Professor Goranson has performed experiments which indicate that the effects of glucagon in inhibiting tumour growth are the result of its effects on the host. With Mr. Cinits, he is continuing studies on the inhibition of tumour growth caused by the diabetic state. The fate of exogenous protein is being followed by the use of labelled amino acids.

Professor C. W. Helleiner is investigating the metabolic activities of mammalian cells in tissue culture with special reference to the mechanisms that control the biosynthesis of macromolecules.

In Professor A. F. Howatson's group, much of the work performed has dealt with the electron microscopy of viruses and cells in tumours of mice and hamsters. These studies suggest a possible relation between the Golgi apparatus of cells and the formation of tumour virus particles. Working with Professor Howatson, Dr. S. Dales has studied the fine structure of the chromosomes of somatic cells. Dr. Dales' studies indicate that chromosomes are composed of fibrillar units 50–200 angstrom units in width. Experiments in which DNA was digested with enzymes from thin sections indicate that DNA is within the fibrillar units. In another study Dr. Dales investigated the rates of growth and of glycolysis in L-cells and in mouse embryonic cells in tissue cultures carried under aerobic and anaerobic conditions. Under anaerobic conditions glycolysis was accelerated and the growth rate of both cell types was reduced.

Dr. E. A. McCulloch has played a major role in the virus work described at the beginning of this report. In addition, he has participated with other members of the virus group in examining experimentally most of the mouse-tumour virus systems that are available. The virus that he recovered from a mouse mammary tumour appears to be closely related to the polyoma virus that was cultivated in cell culture by Stewart, Eddy and associates. Dr. McCulloch has also carried on many studies in connection with total body radiation of mice and the protection afforded by the subsequent injection of isologous, homologous or heterologous marrow. In collaboration with Professor Till, a quantitative study was made in which the number of normal bone marrow cells required to repopulate the marrow and spleens of mice given supra-lethal radiation was determined. Survival was proportional to the number of

cells injected. When the number of cells required for protection was determined, it became possible to investigate the radiation sensitivity of marrow cells irradiated *in vitro*. The work Dr. McCulloch performed in collaboration with Professor Goranson has been described elsewhere in this report. Dr. McCulloch, furthermore, is participating in a clinical study on the use of autologous marrow as an adjunct to the treatment of certain malignancies by radiation and chemotherapy.

Professor L. Siminovitch and his group have been engaged in research in the following areas:

Dr. R. Sheinin is developing a method for purification of the tumour virus isolated in this laboratory. In preparation for projected biochemical work on animal cells infected with this tumour virus, Dr. Sheinin is working on methods for quantitative assay of the virus *in vitro*.

Dr. C. Fuerst has developed a new method for isolating mutant lysogenic bacterial strains that are defective in their ability to produce bacteriophage. About fifty such strains have been isolated and the nature of the inherited defect in each will be investigated genetically and biochemically.

Mr. Fred Kahan has been studying the mechanisms of protein and nucleic acid turn-over in mammalian cells grown *in vitro*. He has developed accurate quantitative techniques for measuring these substances in small numbers of cells.

Mr. R. Kajioka is investigating the growth inhibitory properties of adult cells on embryonic cells grown *in vitro*. He is also engaged in research on the mechanism of multiplication of vaccinia virus *in vitro*.

Studies are also underway on: (1) immunochemical properties of certain bacterial viruses; and (2) the mechanism of multiplication of murine encephalomyocarditis virus. The collaboration of Professor Siminovitch with Professors Axelrad, McCulloch and Cinader is described elsewhere in this report.

In collaboration with Dr. R. B. L. Gwatkin of Connaught Medical Research Laboratories, it has been shown that the viability of mammalian cells can be assayed by their colony-forming ability in unbuffered media plus oxalacetic acid. This technique eliminates the usual requirement for carbon dioxide buffers and special incubators.

Reported by Professor H. E. Johns

Dr. J. Cederlund, with Professor H. E. Johns, has developed a three-electrode ionization chamber which may be used to measure both small and large doses. Such a chamber would have many practical applications in personnel radiation protection.

Dr. J. W. Hunt and Mr. W. B. Sampson have built an electron spin resonance spectrometer. This spectrometer utilizes a micro-wave system operating at 94,000 megacycles per second. It has been designed to have maximum sensitivity and is capable of detecting unpaired electrons associated with 10^{-10} moles of a free radical. This sensitivity is larger by a factor of 10 over most commercial instruments. With this spectrometer, it is hoped to study the reactive free radicals produced by ionizing radiation in aqueous solutions and in living unicellular organisms. The radiation effects will be produced with the proton beam from the 3 Mev Van de Graaff generator.

Dr. Hunt and Professor E. W. Goranson have investigated the possibility of altering the radiosensitivity of tumours in experimental animals by using metabolic inhibitors to change the oxygen tension.

Professor Johns, in collaboration with Professor C. L. Ash, Professor G. F. Whitmore, Dr. Hunt, Dr. J. R. Cunningham and Mr. L. D. Skarsgard, has designed and built special units for radiotherapy using cobalt-60 and caesium-137. The cobalt unit is designed for precision rotation therapy. The effects of penumbra at the edge of the field have been minimized through the use of a large source to rotation axis distance and a small diaphragm to tumour distance. The unit is fitted with an X-ray tube so that tumour localization photographs may be taken with the patient in position for therapy just prior to treatment with the cobalt beam.

Two caesium-137 units, employing 1,300 curies and 250 curies, have been designed and built in the Institute. The large unit is used to treat patients at a source to skin distance of 35 cm. and produces a radiation pattern somewhat similar to a 400 kv. X-ray machine. The smaller unit is used at a treatment distance of 15 cm. and is useful in treating tumours near the surface of the skin as in the head and neck region. Extensive physical measurements on the radiation from these units have been performed. It would appear from these studies that caesium-137 will never replace cobalt-60 in radiotherapy, but that caesium-137 units may well replace standard X-ray machines in the 250 kv. energy range.

Professor Johns, Mr. L. D. Skarsgard and Dr. J. Graham of Roswell Park, Buffalo, N.Y., have measured the radioactivity of spent radon seeds and the dose to patients who have carried these seeds for a number of years. There is some clinical indication that long exposures of local regions in the cervix at low dose rates have caused serious late effects.

Professor Johns and Mr. W. B. Reid are investigating the energy required to produce an ion pair in air by measuring the rise in temperature of a small sample of material placed in a radiation beam and comparing this with the ionization produced in a cavity within the sample of material. This information is required in order to accurately determine the energy absorbed by biological material during radiotherapy.

Professor Johns and Mr. Skarsgard are investigating the spectral distribution of scattered radiation produced in a water phantom by X-rays under radiation conditions used in radiotherapy. From this information it will be possible to convert exposure dose in roentgens to absorbed dose in rads, under clinical conditions.

Professor Johns, Professor Whitmore and Mr. N. Aspin are measuring the energy absorbed from radiation in the region of the interface between two materials of different atomic number. The survival of T-2 phage is being used as a biological dosimeter and with it measurements may be made within 2–5 microns of the interface. Elucidation of this problem is important in the understanding of irradiation involving bones, for, in these, small regions of soft tissue (marrow) are enclosed in material of a high atomic number (calcium).

Professor Johns, Dr. Cederlund and Mr. A. D. Rotenberg are developing a large body scanner using a 5-inch sodium iodide crystal. With this device it is hoped, by a tracer technique, to locate the presence of small metastases before they can be demonstrated clinically.

Professor J. E. Till and Mr. C. P. Stanners have studied the life cycle of L-cells in tissue culture using tritium-labelled thymidine and autoradiographic techniques. The period of DNA synthesis in the mitotic cycle has been measured in this way. DNA synthesis occupies a period of six hours in a twenty-hour division cycle and is completed two to four hours before mitosis.

Professor Till and Dr. E. A. McCulloch made quantitative studies on the number of bone marrow cells required to extend the survival times of lethally irradiated mice. They then irradiated marrow cells *in vitro* before injection and the sensitivity of these cells to radiation was measured through their subsequent effect in prolonging the life of the irradiated mice. By this method it was found that the mean lethal dose of bone marrow cells *in vitro* is 110 r.

Professors Till and Whitmore are investigating the effects of massive doses of X-rays on mammalian cells grown in tissue culture. These massive doses produce a large number of giant cells. Although these cells are incapable of division, experiments show that this is *not*, as was formerly believed, due to a failure of DNA or RNA synthesis because the synthesis of these continues in the giant cells.

Professor Till and Dr. Cunningham have determined the relative biological effectiveness of 250 Kvp X-rays, cobalt-60 gamma rays and 22 Mvp betatron X-rays. This was done by measuring the survival of L-cells grown in tissue culture when exposed to these radiations.

Professor Whitmore and Mr. D. O. Schneider are investigating the effects of mono-energetic neutrons on hamster cells grown in tissue culture. By irradiating these cells at different angles to the target of the 3 Mev Van de Graaff generator, the effects of mono-energetic beams of neutrons of different energies is being investigated.

There is some indication from experiments carried out elsewhere that there may be an unexpected dose rate effect in the range from 20 r/min. to 100 r/min. in the whole body irradiation of mice. To elucidate this possible effect, Professors Whitmore and Johns are looking for a dose rate effect in mammalian cells exposed to cobalt-60 gamma rays with dose rates in the range from 5 to 5000 r/min.

Professor Whitmore and Mr. M. Weber are comparing the sensitivity of mammalian cells to X-rays and ultraviolet light in an attempt to determine the mode of action of ionizing and non-ionizing radiation.

Professors Whitmore and Till with Mr. Stanners are investigating the sensitivity of cells to radiation in different stages of the mitotic cycle. For many years, it has been assumed that cells are most sensitive to radiation just before metaphase. An attempt is being made to produce a cell population in which all the cells divide simultaneously so that the sensitivity of the cell in each portion of its mitotic cycle may be measured.

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- "A Report on the Third Canadian Cancer Research Conference" (*Canadian Medical Association Journal*, vol. 79, no. 3, Aug. 1, 1958, p. 208).
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- CINADER, B. "Immunochemistry" (*University of Toronto Medical Journal*, vol. 36, no. 4, Feb., 1959, pp. 129-40).
- "Professor L. Pillemer" (*Nature*, vol. 181, 1958, p. 234).
- CINADER, B. and PEARCE, J. H. "Immunological Approaches to the Study of Ribonuclease"; in *Symposium on Protein Structure*, ed. A. Neuberger, pp. 240-6. London and New York: Methuen & Co. Ltd., and John Wiley & Sons. 1958.
- "The Specificity of Acquired Immunological Tolerance to Azo Proteins" (*British Journal of Experimental Pathology*, vol. 39, no. 1, 1958, pp. 8-29).
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MEDICINE

Under the direction of Professor R. F. Farquharson

The teaching service at the Women's College Hospital, under the direction of Dr. Jean F. Davey and with the assistance of Dr. Marguerite Hill and Dr. Joan Vale, has been very successful.

The introduction of a clinical physiological conference, taken jointly once a week by members of the Departments of Physiology and Medicine with one-quarter of the third medical year, has proved to be a useful method of teaching.

The appointments as clinical teachers of Dr. R. A. Chambers to work in neurology at the Toronto General Hospital, Dr. Dorothy Ley to work in haematology at the Toronto Western Hospital and Drs. G. W. Stock and G. A. Gow to work at the Toronto General Hospital and teach in the out-patient department are all welcomed.

The establishment of a combined service Respiratory Paralysis Unit at the Toronto General Hospital, with Dr. W. A. Oille as chairman of the committee, has greatly improved the treatment of patients with respiratory paralysis from various neurological disorders, various types of serious respiratory difficulties including serious traumatic injuries of the chest, with barbiturate and other types of poisoning, tetanus, etc. It has stimulated research work in these conditions and improved teaching. The active members of the group include Dr. Colin Woolf (respiratory diseases), Dr. R. A. Chambers (neurology), Dr. H. Barber (ear, nose and throat) and Dr. H. B. Fairley (anaesthesia).

RESEARCH

ARTHRITIS AND CONNECTIVE TISSUE DISEASES

Dr. Wallace Graham continues the search for an effective anti-rheumatic agent which is free from the serious effects of prolonged steroid therapy. Three hundred patients have been treated with a new analogue of phenylbutazone (Metabolite I) which appears to be equally effective as the parent drug, with less gastric irritation. He and his associates at Sunnybrook Hospital have continued active investigation of projects mentioned in last year's report.

Dr. M. A. Ogryzlo has made a broad and extensive study of abnormal serum protein patterns in a wide variety of conditions with special reference to multiple myeloma, many metabolic disorders, collagen diseases, etc. With Dr. Fraser Mustard, he has studied blood coagulation in gout and its relation to atherosclerosis; with Dr. D. B. Montgomery and Dr. J. W. Digby, the valuable uricosuric effect of sulfinpyrazole in gout; with Dr. D. D. McCarthy, a review of eight cases of dermatomyositis with co-existent malignant disease. He has also made studies of respiratory granulomas (Wegener's) associated with polyarteritis, of the high incidence of atherosclerotic lesions in gouty subjects, of the role of tubular reabsorptive mechanisms in the production of the gouty diathesis.

Dr. H. A. Smythe has completed an investigation of the pathology of spondylitic heart disease.

CARDIOVASCULAR AND RESPIRATORY DISORDERS

Dr. C. R. Burton has continued his examinations of electrocardiograms taken on public ward patients at the Toronto General Hospital over the years, and has made a study of 348 consecutive cases exhibiting prolonged A-V conduction defects and/or heart block. He and Dr. A. J. Kerwin at the Toronto Western Hospital have been studying vector cardiography. Dr. Kerwin and Dr. A. W. Chisholm have been investigating other methods by which electrocardiography may yield more information, and also the use of long-acting preparations of quinidine.

Dr. W. F. Greenwood has completed the follow-up study of a patient in whom episodes of cardiac arrest due to sino-auricular block were abolished by section of the right vagus nerve, and Dr. W. A. Oille of an analogous case whose episodes of periodic heart block, often associated with swallowing, were abolished by section of the left vagus nerve. Drs. Greenwood and Aldridge have studied the three patients with myxoma of the left atrium found in about 600 operations for relief of mitral stenosis.

Dr. R. W. Gunton, Drs. Greenwood and Lenkei and Dr. W. Paul (Pathological Chemistry) have completed their initial examination of the diagnostic value of dye dilution curves from multiple injection sites in congenital heart disease. In further work in association with Dr. R. O. Heimbecker (Surgery), they have made use of similar principles and of the injection of the dye into the left ventricle with simultaneous sampling from the left atrium by cuvette to measure the degree of mitral regurgitation in patients with mitral stenosis. Dr. G. Feruglio and Drs. Gunton and Heimbecker have made electrocardiographic observations in 265 patients during left heart catheterization; the occasional arrhythmias noted seemed to offer no contraindication to this procedure. Drs. Lenkei and Gunton made observations on eight patients with rheumatic tricuspid stenosis recognized preoperatively in a group of 291 patients who had commissurotomy for mitral stenosis; four of the patients were greatly improved by the additional tricuspid commissurotomy.

Dr. D. P. Murnaghan has been pursuing his investigations of heart sounds and Dr. Feruglio has made interesting observations on intracardiac phonocardiography, showing that murmurs were recorded only in that chamber or vessel which receives the blood flow responsible for their production.

In pursuit of their investigations of long-term anticoagulant therapy Dr. R. L. MacMillan, Dr. K. W. G. Brown and Dr. David Watt have developed a rapid, simple and practical method for measurement of the prothrombin time of blood obtained by skin prick.

Dr. J. Alick Little, working in association with Drs. Mustard, Murphy and Shanoff at Sunnybrook Hospital, has continued the study of serum lipid levels in coronary heart disease. He also has found the serum glutamic oxaloacetic transaminase activity increased in alcoholics who had no evidence of other disease. Dr. J. K. Wilson and Dr. D. B. Moran have been making a genetic and clinical study of a number of cases of Marfan's syndrome. They are also following the course of patients at St. Michael's Hospital who have undergone mitral commissurotomy.

Dr. John F. Paterson has made an extensive review of silicosis in Ontario at the request of the Minister of Mines. Dr. Adrian Anglin has been studying sarcoidosis. Dr. Colin Woolf continues his detailed laboratory investigations of dyspnoea of patients with disorders of the heart and lungs; at Sunnybrook Hospital he has been investigating the pathogenesis of chronic bronchitis and its effects, using respiratory function tests.

DERMATOLOGY

Dr. N. M. Wrong, Dr. M. Lester and Dr. H. C. Hair have continued their studies of acne in university students and of the effects of new antihistamine drugs on itching and urticaria. Dr. A. L. Hudson has studied the antipruritic action of trimeprazine.

The dermatologists from different hospitals have observed encouraging response of patients with superficial fungus infection to oral administration of a new antibiotic called griseofulvin.

GASTROENTEROLOGY

Dr. Jonathan Sinclair, with Dr. A. E. Franklin (Bacteriology), is pursuing the search for the virus of infectious hepatitis and for serological methods for its detection. Dr. Sinclair's epidemiological study of the 702 cases of infectious hepatitis at Elliot Lake is nearly complete. The protective use of gamma globulin appeared to have an influence in the termination of the epidemic. There was only one fatality, which was not clearly related to the liver disease.

Dr. J. M. Finlay and Dr. K. J. R. Wightman have completed an evaluation of the xylose tolerance test in various disorders. Drs. Finlay and Sumi have been comparing the value of measurement of absorption of radio-isotopic fats with the more laborious chemical methods. Studies of malabsorption in various conditions, including the post-gastrectomy syndrome, have been continued with the collaboration, in part, of Dr. H. J. Watt and Mr. A. Wheatley, a visitor from England in the Department of Surgery.

Dr. Paul O'Sullivan has been observing the value of topical steroid therapy in ulcerative colitis and, with surgical colleagues at St. Michael's Hospital and Sunnybrook Hospital, has been making a clinical investigation of oesophageal hiatus hernia.

Dr. J. R. Bingham is studying the effects of a number of factors on peptic ulceration.

HAEMATOLOGY

Much of the work on haematology is described in Professor Wightman's report of the Department of Therapeutics.

Dr. Dorothy Ley continues her investigations of the influence of neoplastic diseases on various haematological functions including iron metabolism and absorption of vitamin B₁₂.

Dr. C. J. Bardawill's work on changes in certain enzymes and other factors in serum and leucocytes of patients with lymphoma and carcinoma progresses well.

With members of the staff of the Department of Medical Biophysics, Dr. E. A. McCulloch has played a part in the study of a virus isolated in tissue cultures from a mouse mammary tumour. This virus induces lymphomas very rapidly on injection into newborn Swiss mice. Dr. McCulloch has also been working with Dr. Till on the beneficial effects of transfusions of marrow cells into mice whose bone marrow has been largely destroyed by irradiation, and with Dr. Goranson on certain striking serum protein changes in irradiated mice.

Dr. J. G. Watt has been studying the development of anaemia due to drug sensitivity.

METABOLISM and ENDOCRINOLOGY

Dr. J. C. Laidlaw and Dr. M. E. Robertson, with the assistance of Miss M. Stiefel, have shown that on administration of oestrogen to human subjects, as for instance to patients with cancer of the prostate, the plasma hydrocortisone rises to levels which often exceed those found in patients with Cushing's syndrome. This rise is due to retention of hydrocortisone in the intravascular compartment and diminished transformation to its metabolites, and is not associated with a comparable increase in the tissues. In association with Professor A. G. Gornall (Pathological Chemistry), they have also found that administration of progesterone similarly leads to a sevenfold increase in urinary aldosterone excretion, to levels comparable with

those found in the third trimester of pregnancy. Drs. Laidlaw and Robertson have also pointed out that in four of thirty-three cases of Cushing's syndrome observed over the last four and one-half years hypertension was found in the absence of other gross classical manifestations.

Dr. R. H. Sheppard and Dr. Paul (Obstetrics and Gynaecology) have completed studies of the transfer of thyroid hormones across the sheep placenta, and are making similar studies with hormones of other endocrine glands. Dr. Sheppard continues his investigation of the hormone patterns in the serum of thyrotoxic patients.

Dr. H. P. Higgins has made a series of investigations including: the ten-minute uptake of radioactive iodine as a test of thyroid activity; sodium and potassium balances in a patient with primary aldosteronism (with Dr. Gornall), with observations of the effect of an aldosterone-antagonizing steroid lactone S.C.9420 on the electrolyte balance of this patient; iodine metabolism in a patient with iodide-induced goitre, and in another patient with iodide-induced myxoedema.

Dr. MacAllister Johnston and Dr. Robert Volpé, with Dr. D. Schatz, have reviewed a series of over 600 patients with hyperthyroidism treated with radioactive iodine. They are also completing the study of the effect of minute amounts of iodine (1-4 milligrams per day) on thyroid activity in patients with hyperthyroidism.

Dr. E. R. Yendt and Dr. Z. F. Jaworski have continued their studies on the value of differential sodium excretion by the two kidneys in finding which kidney is involved in causing renal hypertension. With Dr. J. C. Laidlaw, they are studying disturbances in potassium metabolism in this disorder as well as in hyperparathyroidism, nephrolithiasis and other metabolic disorders. In an extensive investigation of laboratory measures used in the diagnosis of hyperparathyroidism, they find that the *accurate* determination of serum calcium and phosphorus is the most dependable. Among other observations on the effect of administration of parathyroid hormone, they found a depression in the serum inorganic phosphorus which under certain circumstances was greater than could be accounted for by renal excretion of phosphorus. During the past year they observed a patient with nephrolithiasis associated with an unusual defect of renal tubular function not known to have been reported before: the patient presented many manifestations of renal tubular acidosis but demonstrated in addition an abnormal renal response to alkaline therapy. They have made further interesting observations on the metabolism of phosphorus in a patient with hypophosphataemic vitamin-D-resistant rickets. This patient was excreting more phosphate in the urine under certain conditions than was filtered by the glomeruli.

Dr. A. Rapoport has been studying the mechanism of action of chlorothiazide; the indices of foetal anoxia in amniotic fluid (with Dr. Paul); and the excretion of electrolytes under various conditions (with Dr. T. F. Nicholson and Dr. G. N. Ranking).

Dr. W. E. Hall, with members of the urological staff of St. Michael's Hospital, is studying electrolyte disturbances in subjects with ureteral transplants.

Dr. G. W. Smith has been studying renal biopsies in selected patients with chronic liver disease, and especially those suspected of having the Kimmelstiel-Wilson syndrome.

Dr. Calvin Ezrin and Dr. Peter Moloney (Connaught Medical Research Laboratories) have found a total of eight patients with circulating antibodies which neutralize commercial insulins. With Dr. A. E. Dyer (C.M.R.L.), Dr. Ezrin is studying the response in gonadotrophic excretion to surgical procedures; this work was stimulated by his having found in patients with prolonged fatal illnesses a great reduction in pituitary delta cells which are believed to secrete gonadotrophins. With Drs. Laidlaw and Robertson and Dr. B. Langer (Pathology), he has been studying the diurnal variation in plasma hydrocortisone levels in monkeys subjected to extensive cerebral and hypothalamic lesions. With Dr. L. C. Lax (Physiology), he has been studying transfer rates of radioactive phosphorus in various conditions.

NEUROLOGY

Dr. H. H. Hyland has reviewed all cases of meningitis admitted to the Toronto General Hospital between 1947 and 1956 from the point of view of types encountered and effects of treatment.

Dr. R. A. Chambers has completed a study of the neuropathy associated with peripheral arteriosclerosis. He and Dr. Barbara Hazlett are making a thorough clinical-pathological study of diabetic neuropathies. Dr. Chambers is also investigating the mesenchymal tissue reaction in disseminated sclerosis and non-suppurative necrosis of the spinal cord.

Dr. John Crawford and Dr. Andrew Park are studying denervation and restoration of function in peripheral nerve injuries.

Dr. H. J. Barnett and Dr. W. Loughheed (Surgery) have been working on the problem of stenosis and thrombosis of the carotid artery. Dr. Barnett and Dr. McIlroy have completed a survey of all cases of tabes dorsalis treated with penicillin at Sunnybrook Hospital in the last decade.

Dr. J. A. Walters has made an extensive study of the nature of hysterical pain.

MISCELLANEOUS

Dr. J. D. L. FitzGerald has been continuing studies of glomerulonephritis by serological examinations, in collaboration with the Provincial Health Laboratories, and biopsy observations with Dr. G. N. Ranking (Surgery). With Mr. Sylvio Landi, he has completed a study of mould antigenicity. He is now observing the effect of adenovirus vaccine in asthmatic patients.

Dr. W. B. Spaulding and his associates in the out-patient department, Toronto General Hospital, have begun a long-term study of symptoms in patients coming to the out-patient department.

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OBSTETRICS AND GYNAECOLOGY

Under the direction of Professor D. E. Cannell

Undergraduate and postgraduate teaching programmes have continued with minor modification throughout the past year. The experiment with preceptor training for fourth-year medical students at the Women's College Hospital has proven to be a success. An attempt will be made to permit more student deliveries at the other University hospitals in the coming academic session.

The new central block of the Toronto General Hospital was opened in February, 1959. The teaching facilities and delivery and operating suites have been in use for the latter part of the academic year. The full value of this new accommodation has not yet become apparent owing to minor difficulties and delays which we hope will be overcome by the time the next session commences.

The rotation of postgraduate students in Obstetrics and Gynaecology through the Princess Margaret Hospital has proven of value to them and to this institution.

The Department is pleased to report the success of Drs. J. W. Millson and R. M. Pilkey in obtaining their Fellowship in the Royal College of Physicians and Surgeons of Canada.

It is with great regret that the Department announces the retirement at the end of the academic year of Dr. W. T. Noonan as Associate Professor in charge of Obstetrics and Gynaecology at St. Michael's Hospital. Dr. Noonan joined the Department thirty-four years ago and has given it capable and conscientious service over that period of time. He will devote the additional time now available to his private practice.

The Department was honoured by visits from Professor R. Caldeyro-Barcia, Montevideo, Uruguay; Mr. Leslie Williams, London, England; Dr. H. B. Attlee, Halifax, Nova Scotia; Dr. Robert Bannerman, Accra, Ghana; and Professor Allan C. Barnes, Cleveland, Ohio. Many visitors from the U.S.S.R. spent several days in the Department after the conclusion of the International Congress of Obstetrics and Gynaecology in Montreal in June, 1958. Language difficulties prevented as free an exchange of knowledge as we desired, but on the whole the visit proved enjoyable and enlightening for all parties.

Members of the staff made contributions to national and international meetings. A closed circuit television programme for the Ontario Medical Association's meeting in May was organized by Dr. W. H. Allemang, and this proved a resounding success.

The Head of the Department wishes again to acknowledge his gratitude to the members of his staff for their loyalty and effort in fulfilling their University responsibilities. He would particularly like to extend his gratitude to Dr. D. N. Henderson who acted as Head of the Department during his absence abroad.

RESEARCH

Members of the staff have undertaken the following research work:

Dr. M. L. Bunker is continuing his studies on ascitic fluid in patients with ovarian cancer. He has completed a clinical study of the value of "Enovid" in functional uterine bleeding. The results of this study will be available for assessment in the near future.

Dr. J. A. Low and his associates have continued their studies of foetal oxygenation in abnormal obstetrical patients. Their studies in a series of 750 normal pregnancies have been completed and are in the press. Procedures for the evaluation of the acid-base status of newborns have been extensively explored and the initial studies of normal and abnormal obstetrical problems are being carried out. The clinical study of urinary incontinence continues in a clinic as a separate unit.

Dr. W. M. Paul, Dominion Stores Fellow, attended the first Workshop in Foetal and Uterine Physiology at Western Reserve University in February, 1959, and has conducted the following investigations. (1) With Dr. R. H. Sheppard, the study of placental transfer of thyroid hormone, triiodothyronine iodine, and thyrotropin was completed. (2) A similar study involving the placental passage of iodine-labelled insulin has been begun and will continue next year. (3) With Dr. A. Rapoport and Dr. J. Kapsos, a pilot study of the chemistry of amniotic fluid was begun. Specifically, the project is designed to detect chemical changes in amniotic fluid secondary to uterine ischaemia. Using the rabbit as an experimental animal, consistent significant changes in the relation of lactic acid to pyruvic acid have been demonstrated in the fluid from uteri rendered ischaemic. An expansion of this project will constitute the major investigation of the coming year. (4) In co-operation with the Departments of Medicine and Urology at the Toronto Western Hospital, an investigation of pre-eclampsia and nephritics during pregnancy was begun, utilizing renal function tests and kidney biopsy.

Drs. J. Kapsos and M. M. Spivak, graduate students, have completed a haematological study of newborns in normal pregnancies under the direction of Dr. J. A. Low. This will be continued in obstetrical complications.

Dr. D. Kumar, a graduate student, in collaboration with Dr. A. G. Gornall, has completed his studies on aldosterone excretion and tissue electrolytes in normal pregnancy and pre-eclampsia. He has succeeded in producing a condition resembling pre-eclampsia in experimental animals. This work is being continued.

PUBLICATIONS

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OPHTHALMOLOGY

Under the direction of Professor A. J. Elliot

The postgraduate programme in ophthalmology was continued in 1958-9 and fourteen postgraduate students were registered in the department. Dr. S. R. Frankling, Saskatoon, Sask., and Dr. D. J. McDonald, Cornwall, Ont., were appointed Canadian National Institute for the Blind Fellows. Dr. G. S. Harris, Cranbrook, B.C. was appointed a Fellow to work under a grant from the Defence Research Board. Dr. W. D. Samis, Toronto, Ont., was appointed a Fellow to work under the National Health Grant "Pathogenesis of Retinal Detachments." Squadron Leader D. E. MacLeod, R.C.A.F., Pictou, N.S., commenced training at Sunnybrook Hospital and Dr. Alain Rousseau, Quebec, commenced his training at the Toronto General Hospital. Four students completed their postgraduate studies: Dr. R. K.

Langley, Brantford; Dr. B. M. Bradley, Sarnia; Dr. P. L. Morton, Toronto; and Dr. J. Dumas, Quebec, who will continue his studies in retinal detachments in Boston.

The undergraduate teaching programme continued as before with the emphasis in the third year on bedside clinics in ophthalmoscopy. Miss Elizabeth N. Chenault was awarded the J. F. Hartz Company prize for obtaining the highest mark in ophthalmology in the third medical year.

The first departmental research meeting was held during the year and eighteen papers from members of the staff and visitors were presented. The meeting was held on the same day as the inaugural Walter W. Wright Lectureship by Professor Norman Ashton, Director of Pathology, Institute of Ophthalmology, London, England. Dr. Walter Wright, Professor Emeritus in the Department of Ophthalmology, was honoured by the establishment of this lectureship in his name with funds raised by staff members, former students and friends.

The Charles Mickle Fellowship was awarded to Sir Stewart Duke-Elder for his outstanding researches in ophthalmology. Sir Stewart lectured at the University on "Recent Advances in the Diagnosis and Treatment of Glaucoma."

The Department received visits from: Dr. Theodore Schmidt, Switzerland; Professor Tunekazu Yuge, Dr. Kohei Ohashi, Dr. Noborn Kunitomo, Japan; Dr. Kenneth Howsam, Australia; Dr. Michel Mathieu, Quebec; Dr. Keith Lyle, England.

The Department is grateful to an anonymous benefactor for establishing the "Selkirk Eye Research Fund" for research in the prevention and treatment of blindness and for the assistance of personnel engaged in this work. These funds were used to support, in part, the researches in glaucoma by Dr. J. S. Speakman.

The Department displayed two scientific exhibits at the meetings of the College of General Practitioners' Convention and the Ontario Medical Association. These exhibits were from the Eye Bank of Canada (Ontario Division) and the glaucoma service.

In addition to lectures given within the University, members of staff have given papers at meetings outside Toronto: Dr. A. J. Elliot, at the American College of Surgeons in Montreal and the Michigan State Medical Society in Detroit; Dr. J. S. Crawford, Dr. J. C. Hill and Dr. D'Arcy Macdonald, at the American Academy of Ophthalmology and Otolaryngology in Chicago; Dr. C. McCulloch, Dr. H. R. Hausler and Dr. S. J. Vaile, at the East-Central Section Meeting of the Association for Research in Ophthalmology at Cincinnati, Ohio; Dr. H. L. Ormsby and Dr. D'Arcy Macdonald, at the Medical Alumni Association; Dr. H. L. Ormsby also contributed to the course in Public Health and Preventive Medicine; Dr. H. M. Macrae, at the New York Eye and Ear Infirmary Alumni Association; Dr. D'Arcy Macdonald took part in the Postgraduate Medical Education Meeting of Durham and Northumberland; Dr. R. G. C. Kelly provided a course of lectures to the students taking the Diploma of Industrial Health and also gave a lecture to the Grey County Medical Association; Dr. L. A. Lloyd spoke at the Leaside and Port Credit Public Schools.

Dr. G. A. Thompson was appointed as Medical Director of the Eye Bank of Canada (Ontario Division). Dr. P. K. Basu completed his studies in the Eye Bank and has returned to India.

The resignation of Dr. H. L. Ormsby was received with regret.

RESEARCH

Members of the staff have undertaken the following research work:

The National Health Grant for "Prevention of Blindness from Glaucoma" was continued under the direction of Dr. T. H. Hodgson. The aqueous outflow channels in rabbit eyes have been traced *in vitro* by Dr. R. K. MacDonald by perfusion of the anterior chamber with dyes and particulate matter. When a portion of sclera in rabbit eye is segregated from the blood vascular system and allowed to heal, an increased aqueous outflow results. A method of doing tonography in these animals has been

devised where one eye is intermittently compared with the other in order to overcome certain discrepancies caused by changes in respiration and depth of anaesthesia. Corneoscleral tonography done on the opposite and apparently normal eye of patients with proven closed angle glaucoma placed the untreated eye in the glaucoma group. After peripheral iridectomy these cases fall in the normal group.

The increase in the number of patients referred for electronic tonography has necessitated Miss S. Hennighausen devoting all of her time to this work and to operation of the tonometer testing station. Experience has shown that the electronic tonometer is a useful tool in the diagnosis of glaucoma but that it should be used in conjunction with, and not replace, other methods of investigation.

Dr. John Speakman joined the glaucoma clinic on his return from England and laboratory facilities have been provided to enable him to continue work which was begun at the Institute of Ophthalmology in London on the anatomy and histochemistry of the trabecular meshwork.

The National Health Grant for "Studies on the Prevention and Treatment of the Ocular Complications of Diabetes" was continued under the direction of Dr. H. R. Hausler in a research unit set up jointly by the Departments of Ophthalmology and Physiology. He and Dr. Thor Sibay are conducting experimental studies on diabetic retinopathy. The work generally concerns the prevention and treatment of diabetic retinopathy and it is hoped to provide an experimental basis for a more effective clinical therapy. In the course of these experiments, a new injection technique was developed for the study of retinal blood vessels.

The National Health Grant for "Eye Bank and Corneal Transplantation" was continued. Dr. P. K. Basu, with the assistance of Mrs. I. Fielding, Miss I. Miller and Mrs. A. Wolfe continued his studies on corneal grafting. By using a new technique, the sex chromatin in corneal stroma cells of human, cat and rabbit eyes was identified. By employing tissue culture techniques, it was possible to get the stromal cells as a monocellular layer and the cell could be studied in two dimensions. For a study of the fate of the corneal grafts, corneal tissue from one sex was grafted on to the cornea of the opposite sex in cats by lamellar and penetrating methods. It was observed that at least up to a period of three months, the sex characteristics of the grafts remained unchanged. Corneal donor tissues from human and bovine eyes were stored *in vivo* in the intracorneal space of rabbits. It was revealed that both the specific antigen and the antigen responsible for graft reaction can be modified by *in vivo* storage of the donor tissues prior to grafting.

An electrophoretic study on the protein extracts prepared from mammalian and avian corneae was carried out, and it was found that the antigen-stimulating fractions III and IV were highest in bovine corneal extracts, lower in human and monkey, and least in chicken and rabbit.

Mrs. A. Wolfe, in conjunction with the Canadian National Institute for the Blind, has continued to obtain eyes for the Eye Bank and distribute them to surgeons for corneal grafting. More than ninety-one successful corneal grafts have been performed at the Toronto General Hospital as part of this programme.

Dr. G. A. Thompson, who is now directing this grant, is initiating the study of treatment of vascular lesion of the cornea introduced by alkali burns.

The National Health Grant for "Biochemical Studies of the Cornea" has continued. Dr. Nina Morley, with the assistance of Miss I. Miller and Mr. A. Toth, has continued the biochemical investigation of metabolic processes contributing to cloudiness and vascularization of the cornea in keratoplasty. The high levels of pyridine nucleotides in the epithelium and the growth rates of the three corneal layers in tissue culture suggests that this will develop into a promising study of respiratory activity in the cornea.

Dr. M. Shea commenced working under a National Health Grant on "Investigation into the Pathogenesis of the Detachment of the Retina." With the assistance of Dr. S. R. Frankling, research was carried out on the effect of injection of Caregeenan into the cortical layer of rabbits' vitreous. This material had an unusual effect on

condensation of collagen and caused an initial granulomatous response with an increased collagen content, followed by a resolution and almost complete disappearance of collagen in the area injected.

The National Health Grant for "Ocular Diseases of Virus Aetiology" was continued and completed under the direction of Dr. H. L. Ormsby. Mrs. A. Fowle and Mrs. V. Simmons studied latent herpes simplex virus in human corneal discs removed from patients undergoing keratoplasty. Three isolations of virus were made from fifteen corneal discs investigated. The study of various "trigger" mechanisms for reactivating latent herpes infection in rabbits' eyes was completed. The percentage of reactivation after various time levels up to four months was determined and the serum antibody level was followed during this period of latency and after reactivation.

Under a Defence Research Board Grant, Dr. C. McCulloch has directed the work of Dr. G. S. Harris on the neutralization of the action of disopropyl-fluorophosphate by an oxime (monoisonitrosoacetone).

At the Toronto General Hospital, Dr. G. A. Thompson continued his research into the use of radioactive phosphorus as an aid in the diagnosis of ocular tumours. Dr. W. R. F. Luke has assumed the direction of the glaucoma laboratory and services at the Toronto General Hospital.

The work of the neuro-ophthalmology clinic under the direction of Dr. L. A. Lloyd was continued under a grant from the J. P. Bickell Foundation. Funds from this grant were used for diagnostic X-rays and drugs were distributed free of charge to patients who were unable to pay. A close liaison was kept with the neurosurgical clinic, so that the resulting effects of various neurosurgical techniques on vision and ocular muscles could be evaluated and the cases followed up in the clinic. With the assistance of Dr. P. L. Morton, a study of the ophthalmodynamometer was made on patients in the clinic. A similar neuro-ophthalmology clinic has been established at the Hospital for Sick Children under the direction of Dr. L. A. Lloyd.

Dr. A. J. Elliott continued his clinical research on recurrent intraocular haemorrhage in young adults (Eales' disease) with continuous subconjunctival therapy with prednisolone.

At the Hospital for Sick Children, Dr. A. Lloyd Morgan has continued the investigation of causes and treatment of strabismus with the assistance of a National Health Grant. Dr. J. S. Crawford has been studying cases of convergence excess treated with fluoropryl. Twenty-four cases have been controlled with fluoropryl where the eyes were straight for distance and an esotropia present when looking at near objects. A number of these cases have been gradually removed from the drug and their eyes have remained straight. The study of the repair of ptosis using levator resection through the skin and from the conjunctival surface of the lid have been continued. Dr. W. P. Callahan continued the investigation of amblyopia including pleoptic treatment.

At the Toronto Western Hospital, Dr. D'Arcy Macdonald continued the direction of the Low Vision Clinic in collaboration with the Canadian National Institute for the Blind.

At St. Michael's Hospital, Dr. W. P. Callahan continued the study of slit lamp photography jointly with Dr. S. J. Vaile. Under the direction of Dr. M. Shea, a retina clinic has been established. Study has been made into instrumentation.

PUBLICATIONS

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 ——— "Storage of Corneal Grafts" (*American Journal of Ophthalmology*, vol. 47, no. 2, Feb., 1959, pp. 191-5).
 BESWICK, A. J., LANGLEY, R. K. and MCCULLOCH, C. "Factors Influencing the Movement of Fluorescein in the Cornea" (*American Journal of Ophthalmology*, vol. 46, no. 1, pt. II, July, 1958, pp. 62-7).
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- ELLIOT, A. J. "Lacrimal Hyposecretion" (*Canadian Medical Association Journal*, vol. 79, no. 5, Sept. 1, 1958, pp. 371-8).
- "Panel on Glaucoma" (*Transactions of the Canadian Ophthalmological Society*, vol. 10, 1958, pp. 105-7).
- "Recurrent Intraocular Haemorrhage in Young Adults (Eales' Disease)" (*Transactions of the American Ophthalmological Society*, vol. 61, 1958, pp. 383-98; *American Medical Association Archives of Ophthalmology*, vol. 61, no. 5, May, 1959, pp. 745-54).
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- MACDONALD, D. "Experiences with the Low Vision Clinic" (*Transactions of the Canadian Ophthalmological Society*, vol. 10, 1958, pp. 24-30).
- MORTON, P. L., ORMSBY, H. L. and BASU, P. K. "Healing of the Endothelium and Descemet's Membrane of Rabbit Cornea" (*American Journal of Ophthalmology*, vol. 46, no. 1, pt. II, July, 1958, pp. 62-7).
- ORMSBY, H. L. "Here are the Facts about Eye Banks and Corneal Grafting" (*Health*, May, 1958, pp. 10-14).
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- ORMSBY, H. L. and LAWTON, R. D. "The Ontario Eye Bank and Corneal Grafting" (*Transactions of the Canadian Ophthalmological Society*, vol. 10, 1958, pp. 160-7).
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- "Trabecular Structure in Relation to the Problem of Glaucoma" (*Proceedings of the Royal Society of Medicine*, vol. 52, no. 1, Jan., 1959, pp. 69-74).
- THOMPSON, G. A. "The Use of Radio-active Phosphorus in the Diagnosis of Ocular Tumours" (*Transactions of the Canadian Ophthalmological Society*, vol. 10, 1958, pp. 98-104).
- VAILE, S. J. *et al.* "Composite Mounting of Thirty-five Millimetre Colour Transparencies" (*American Medical Association Archives of Ophthalmology*, vol. 60, no. 2, Aug., 1958, pp. 321-3).

OTO-LARYNGOLOGY

Under the direction of Professor P. E. Ireland

During the past year the Department of Oto-laryngology has again lost a member of the staff who contributed a considerable amount of research and clinical service to this Department. Dr. Howard Burnham had retired to the position of Honorary Consultant two years before his death but still continued to aid our Department in its work. His father was at one time the Professor of Ophthalmology and Oto-laryngology in the University of Toronto and his son followed in his footsteps. He produced an article on the circulation of the nose based on original anatomical research and also investigated the effects of draughts on the volume of blood-flow within the nasal cavernous tissue. These were published and received very favourable comment from the specialty at large as well as from the anatomists. He was a veteran of World War I in which he served as a Battalion Medical Officer, and was in command of a militia field ambulance in World War II with the rank of Lieutenant Colonel.

The graduate course has continued at a three-year level. At one time it was feared that we might have difficulty in obtaining sufficient people to fill this course, but at the present there are many more applicants than it is possible to accept.

Changes are being made in the teaching owing to the fact that the Royal College of Physicians and Surgeons is preparing different regulations with regard to the training of specialists. There will be no difficulty in our Department in moulding our teaching to satisfy the new regulations which will be required.

We have now changed our Pathological Laboratory to a Research Laboratory and the pathology which was formally done in the Banting Institute will now be done at the Toronto General Hospital. This will have the added advantage of weekly seminars conducted by Dr. William Anderson, the Hospital Pathologist, with a monthly seminar or clinical-pathological conference for the staff and oto-laryngological interns. The rooms formerly used in the Banting Institute for pathology will be the headquarters for research which will be conducted by Dr. W. H. Johnson, physiologist, and Dr. J. Farkashidy. Dr. Johnson, who is also employed by the Defence Research Medical Laboratories, is on a part-time fellowship to our department under the O'Keefe Foundation. He has also been added to the staff of the Department of Physiology of the University of Toronto under Professor Charles Best. We have also added to our Department Mr. W. E. Hodges who is a sound engineer and specialist in acoustic physics. These two, along with Dr. Farkashidy, who is to be a Research Assistant under the National Research Council, make a well-balanced team in the basic research in our specialty.

During the year we have been closely associated with the Department of Rehabilitation Medicine, under Dr. Jousse, in the establishment of the new course of Audiology and Speech Therapy. A number of our staff have acted as lecturers in this course including Dr. J. K. B. Smith and Mr. Hodges. The first year of the course has been completed and has been quite satisfactory. This is an important group who are being trained, at a university graduate level, to take their place in the teaching of this specialty throughout Canada. We are pleased to report that the first class has been quite successfully initiated in this special study during the past year.

In the fall of this year, with the help of the Ontario Cancer Foundation, a course was established for one week for those patients who have had their larynx removed by surgery for carcinoma. This entailed a considerable expense which was financed by the Cancer Foundation, including the use of an experienced speech therapist, Mr. J. McAleer from New York City. It was found that there were about 170 people who had been so operated upon successfully in Ontario and 104 of these were able to attend the course. It proved to be most successful and led to the appointment by the foundation of a speech therapist especially interested in this work. Miss Quinn was sent to New York for eight weeks' training in this special type of therapy and is now established for the clinical teaching of patients and also for the teaching of students in our specialized course.

Dr. Joseph A. Sullivan, former Assistant Professor of this Department and Oto-laryngologist-in-Chief at St. Michael's Hospital, has continued to have an interest in this department through the Sullivan Research Fund for audiology and vestibular problems at St. Michael's Hospital. He has been made a Member of Council of the American Otolaryngological Society and is also President of the Otosclerosis Study Group of the American Academy of Ophthalmology and Otolaryngology.

The Head of the Department has continued as a Member of Council of the Canadian Otolaryngological Society, the American Triological Society, and the Royal College of Physicians and Surgeons of Canada. He is to be Chairman of the Section of Otology and Laryngology of the combined meetings of the British Medical and Canadian Medical Associations to be held in Edinburgh in July, 1959. He will also give papers in Paris, France, and Zurich, Switzerland. During the spring months he was lecturer at the seminars of the University of Miami and also the Georgia Society of Otolaryngology.

Dr. G. Arnold Henry is the President of the Canadian Otolaryngological Society and also Chairman of the Programme Committee for the combined Edinburgh meeting this summer. Dr. Henry, Professor Ireland and Dr. T. J. Molony will attend the

meetings of the Section of Otology of the Royal Society of Medicine in Derby, England, and the Scottish Society in Edinburgh, Scotland. Dr. Henry is to chair a round table discussion on "Vertigo" at this latter meeting and will also be the representative of the Canadian Otolaryngological Society at the joint meeting of the British and Canadian Medical Associations in Edinburgh.

RESEARCH

Members of the staff have undertaken the following research work:

Further studies involving the vestibular clinic at St. Michael's Hospital, for a clinical assessment of vestibular disease, are being conducted by Dr. W. H. Johnson and Dr. J. K. B. Smith. These consist essentially in devising a new type of rotating device which will allow the selective testing of the various parts of the non-auditory labyrinth. This is being done by the rotation of the patient with concomitant control of head movements. The patient's head is placed in various positions at specific distances from the centre of the body rotation. The eye movements from the various types of stimulation are recorded electronically together with facial observation of eye movements by closed-circuit television. This equipment which has been devised and which is in active use is quite a new method in the study of this problem. This significant contribution has resulted in a publication, "The Further Studies of the Function of the Utricular Macula." It has also been selected for the Year Book of Ear, Nose and Throat.

Drs. Smith and Johnson have also initiated fundamental research methods in an attempt to establish the specific function of the separate components of the organ of balance. This involves the use of experimental animals and is also being sponsored by the Defence Research Medical Laboratories at Downsview as well as this Department. The surgical resection and direct nerve stimulation of the particular nerve supply have contributed a considerable amount to our knowledge of the physiology of the otoliths and the semi-circular canals. Mr. K. Money, a graduate of the Department of Physiology, is assisting in this work. A preliminary report has appeared in the *Canadian Journal of Physiology and Biochemistry*.

Dr. Smith and Dr. J. Farkashidy, along with Dr. Johnson, have been conducting experimental work on monkeys with regard to the damage to the internal ear by high intensity noise levels, such as those produced by jet aircraft. This has also been a joint problem with the Defence Research Medical Laboratories and entails the use of the new pathological laboratory under Professor Emeritus Eric Linell. Monkeys so exposed have their temporal bones removed and are examined for damage to the internal ear in this study.

Dr. H. O. Barber has continued his clinical research on patients with vertigo at the Toronto General Hospital and Sunnybrook Hospital, and has assembled a great deal of detail in these studies which is very nearly ready for publication. A portion of this work was presented to the Canadian Otolaryngological Society in Halifax in June 1958.

Dr. R. D. Bell has been assisting Dr. J. D. L. Fitzgerald in the Allergy Department of the Toronto Western Hospital in the investigation of nasal tissue changes in patients with nephritis and other general medical diseases. This is being done under a National Research Council Grant through the Allergy Department of the Toronto Western Hospital.

Dr. Page Statten, along with Dr. J. B. Whaley, has continued the audiometric studies of deafness in children. This includes the psychogalvanic skin reaction tests which are so necessary in these younger patients. Part of this work was described by Dr. Whaley at the recent meeting in San Francisco of the American Society. Also being studied under a Health Grant at the Hospital for Sick Children is the hearing in children with cleft palate defects. This is part of a joint programme on cleft palate research in the Hospital for Sick Children.

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PAEDIATRICS

Under the direction of Professor A. L. Chute

The teaching schedule developed over the last few years was continued unmodified. The advent of the Hospital Insurance Plan in January, 1959, has, however, posed a number of problems in relation to the maintenance of teaching beds. It would seem highly desirable that the University should establish, as soon as possible, some suitable standard regarding the control of such beds.

The proposed building plan at the Hospital for Sick Children should provide for an enlarged out-patients department which, it is hoped, will make it possible to give more training in this area to undergraduate students as well as some increased insight into the various specialties in paediatrics. The problem of providing a proportion of full-time University-supported teachers for a department which is responsible for teaching approximately 300 students in the third and fourth years continues.

In an attempt to bring about a closer liaison between the basic science departments and the clinical services, a number of lectures have been arranged with the basic science departments concerned in an effort to help the undergraduates grasp the importance of science in their clinical years. Dr. Slater has lectured to classes in biochemistry. Dr. Fraser has been associated with a seminar in physiology, and Dr. Sass-Kortsak has been appointed to the Department of Pathology. It is hoped that an increasing number of medical graduates will take up postgraduate scientific training in preparation for academic positions. A special committee of the Faculty has been studying the problem of inaugurating such a training programme.

As a number of paediatricians have been applying for an advanced graduate training course in clinical paediatrics, this Department took part for the first time this year in the annual advanced postgraduate training course put on by the other clinical departments.

RESEARCH

As in previous years, the research work of the members of the Department of Paediatrics has been carried out in association with the Research Institute of the Hospital for Sick Children.

Members of the staff have undertaken the following research work:

Dr. A. Sass-Kortsak has further elucidated the turn-over of ceruloplasmin and its uptake of copper by employing radioactive isotope techniques.

Dr. R. Slater and Dr. C. P. Rance have continued their studies on disturbed renal function and in the investigation of the problems of hypertension in children.

Dr. Donald Fraser has continued his studies on the interrelationship of parathyroid glands and renal tubules in regard to phosphorous and calcium homeostasis. He has also continued his interest in the management of phenylpyruvic oligophrenia by means of phenylalanine poor diets.

Dr. Paul Swyer has continued his studies into the problems associated with respiratory difficulty in the newborn.

Dr. J. D. Keith and Dr. R. D. Rowe have continued their studies on heart disease in children, and Dr. Rowe has made a special study of heart sounds and murmurs in the immediate post-natal period.

Dr. Escardo, who has been working with Dr. J. S. Prichard on the question of the twitching episodes in newborn infants, has carried out an extensive study on the relationship to the development of microcephaly. An earlier suggestion that this might be related to disturbed phosphorous balance in the first few days of life has not been substantiated experimentally.

Dr. S. H. Jackson has continued his studies on mucoproteins in the urine.

Dr. John Bailey has been studying the metabolic and growth effects of human growth hormone on pituitary dwarfs. In conjunction with Dr. Slater, he has been attempting to devise a method for measuring growth hormone by means of the immunochemical techniques.

Dr. Crozier has been studying the problem of fibrocystic disease with relation to the effect of saline aerosols in liquefying the mucus secretions of the bronchi.

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- COLLINS-WILLIAMS, C. *et al.* "Analysis of Protein Skin Reactivity in Infantile and Childhood Eczema" (*A.M.A. Journal of Diseases of Children*, vol. 96, no. 2, Aug., 1958, pp. 184-90).
- FOWLER, RODNEY S. "Accidents in Childhood" (*Canadian Medical Association Journal*, vol. 79, no. 4, Aug. 15, 1958, pp. 241-6).
- FRASER, D. and SALTER, R. B. "The Diagnosis and Management of the Various Types of Rickets" (*Pediatric Clinics of North America*, May, 1958, pp. 417-41).
- FRASER, D., MUNN, J. D., *et al.* "Calcification Studies in Clinical Vitamin D Deficiency and in Hypophosphataemic Vitamin D-Refractory Rickets: The Induction of Calcium Deposition in Rachitic Cartilage without the Administration of Vitamin D" (*A.M.A. Journal of Diseases of Children*, vol. 96, no. 4, 1958, pp. 460-3).
- MCKENDRY, J. B. J., ARMSTRONG, J. G. *et al.* "Methaemoglobinaemia in Infancy" (*Canadian Medical Association Journal*, vol. 79, no. 5, Sept. 1, 1959, pp. 392-5).
- MCKENDRY, J. B. J., LAFORREST, L., *et al.* "A Study of Enuresis" (*Canadian Medical Association Journal*, vol. 79, no. 11, Dec. 1, 1958, pp. 899-902).
- MURPHY, E. G. and CHERNIAK, M. M. "Glutamic Oxalacetic Transaminase Activity in the Serum in Muscular Dystrophy and Other Neuromuscular Disorders in Childhood" (*Pediatrics*, vol. 22, no. 6, Dec., 1958, pp. 1110-14).
- RANCE, C. P., SLATER, R. J. *et al.* "Influence of Steroid Therapy on the Nephrotic Syndrome in Children" (*Canadian Medical Association Journal*, vol. 80, no. 6, March 15, 1959, pp. 430-2).
- SASS-KORTSAK, A. "Treatment of Hepatic Coma" (*Pediatrics*, vol. 23, no. 1, part 1, Jan., 1959, pp. 5-7).

PATHOLOGICAL CHEMISTRY

Under the direction of Professor James A. Dauphinee

During the present session 140 students in the third year of the medical course have been enrolled in the Department and six students have been carrying out

postgraduate work, including one candidate for the Ph.D. degree, one for the M.A., and two for the B.Sc.(Med.).

In the undergraduate course, emphasis has continued to be placed on the importance of understanding as fully as possible the basic disturbances in physiology and biochemistry in the investigation of disease in the human patient. The work in the laboratory has centred around the "case method" of study and this has been supplemented by frequent informal seminars in small groups with an instructor during which the clinical history and manifestations of a given patient are correlated in a critical fashion with the laboratory findings.

No changes in the professorial personnel of the Department have taken place during the past year, but we are happy to welcome back Dr. A. Rapoport who has been appointed to our staff as a Research Associate. Dr. Rapoport received his M.D. from this University and his M.A. from this Department. He then took further postgraduate training with Professor E. J. King at the Post-graduate Medical School in London and with Professor Jerome Conn at the Department of Endocrinology, University of Michigan. He has returned to Toronto to be the Clinical Director of the Biochemistry Department of the Toronto Western Hospital and it has fortunately been possible to have him appointed to our staff as well.

RESEARCH

Various members of the Department have continued to collaborate with physicians in the clinical departments of the Toronto General Hospital and Sunnybrook Hospital (D.V.A.) in the investigation of a number of clinical problems.

Dr. J. A. Dauphinee and Mr. C. E. Downs, along with Dr. J. C. Richardson and other members of the neurological staff of the Department of Medicine, have continued their studies of copper metabolism in patients with Wilson's disease and other neurological disorders. Patients with ordinary Parkinson's syndrome show no abnormality of copper metabolism whereas patients with Wilson's disease (who may at times be thought to be suffering from Parkinson's disease) characteristically show a high copper excretion in the urine along with decreased copper and ceruloplasmin levels in the serum. The establishment of a correct diagnosis is often materially assisted by these biochemical investigations and is of great importance because of the very favourable response frequently shown by patients with Wilson's disease to treatment with the chelating agents BAL and penicillamine. These drugs are very effective in freeing these patients from much of their excess copper and their administration is often followed by distinct evidence of considerable clinical improvement. In this connection it is interesting that D-penicillamine (the naturally occurring isomer of this amino acid, kindly supplied for investigation by Dr. Tosoni of the Connaught Laboratories) has been found to be no more effective than the racemic DL-penicillamine in promoting the removal of copper from these patients.

Dr. Barry Tobe has carefully investigated the methods employed for the determination of the very small amounts of ammonia in blood and has established conditions for the procedure which gives reliable and reproducible results. He has applied this technique to the study of the elevated blood ammonia levels in patients with hepatic coma and to the investigation of the usefulness of the intravenous administration of arginine-glutamate in the treatment of this condition.

Dr. Dauphinee, with Dr. J. C. Sinclair of the Department of Medicine and Dr. Anne Patzauer of Sunnybrook Hospital, has continued his studies on patients with various forms of liver disease. These studies have included investigations of (a) the effect of posture, low salt intake, and the administration of some of the newer diuretics such as chlorothiazide, hydrochlorothiazide and flumethiazide on the excretion of sodium, potassium and water, in patients with cirrhosis and ascites; (b) the effect of feeding diets containing large amounts of highly unsaturated fatty acids on the elevated serum cholesterol levels in patients with primary or secondary biliary

cirrhosis, (c) the relative usefulness of the various biochemical tests, including serum enzyme determinations, in the differential diagnosis of the jaundiced patient.

Mr. L. A. W. Feltham has almost completed his studies of the influence of various hormones on the electrolyte content of muscle.

Reported by Professor T. F. Nicholson

Dr. Nicholson has continued the studies on the localization of functions in the renal tubule. It has been shown that the sodium retaining action of aldosterone is located in the last part of the proximal tubule whereas the potassium excreting effect of that hormone is exerted in the distal tubule. It has also been found that slight damage to the last part of the proximal tubule results in a derangement of excretion of acid, sodium, chloride and electrolyte, very similar to that found in clinical cases of hyperchloraemic acidosis.

Dr. A. Rapoport has extended his investigations of the transfer of electrolytes across the wall of the urinary bladder and has shown that the movement is probably a passive one in the direction of the concentration gradient.

Reported by Professor A. G. Gornall

Dr. D. Kumar has attempted to produce experimental pre-eclampsia in dogs by partial ligation of the blood supply to the pregnant uterus; preliminary results are encouraging.

Dr. Velta Cernavskis has set up techniques for investigating the protein binding of steroids, one of the factors affecting the biological activity of hormones.

Dr. J. J. A. Fraser has made a study of the effect of ovarian hormones on adrenal regeneration hypertension in rats.

Mr. B. Eglitis has achieved some further improvements in the method for estimating adrenalin and noradrenalin in urine.

In the Steroid Hormone Laboratory, the microchemical estimation of aldosterone in urine has been carried out with the assistance of Mrs. C. Gwilliam, Mrs. M. L. Schönbaum and Mrs. V. Barcza. Efforts are being made with the help of Mrs. M. Kandel to improve the method with the use of radioactive steroids.

In the Clinical Investigation Laboratories, Mrs. V. Reinholds has been responsible for the analysis of nitrogenous and ketone substances. Mrs. H. Pavuls for the 17-ketosteroid and ketogenic-corticoid determinations. Mrs. Pavuls and Mrs. B. Grajman have mastered the technique of tissue electrolyte analysis and we can now move ahead with our work in this field.

The following problems have been under study during the year by Dr. Dauphinee and Dr. A. G. Gornall in collaboration with the clinical departments: (a) the effect of salt, water and posture on electrolyte metabolism and ascites formation in patients with cirrhosis, with Dr. Patzauer, Sunnybrook Hospital; (b) hormonal and metabolic studies in periodic catatonia, carried out with the help of Miss Amy Britton, in collaboration with Dr. J. Lovett Doust and associates, Psychiatry; (c) factors affecting the secretion, metabolism and excretion of aldosterone, with Dr. J. C. Laidlaw, Medicine; (d) aldosterone excretion in patients suffering from hypertension, oedema or related disorders, with clinicians in several departments.

The generous assistance provided by grants from the Medical Division of the National Research Council and from the J. P. Bickell Foundation is gratefully acknowledged.

Reported by Professor W. Paul

Members of the Biophysical Laboratory have continued studies undertaken in collaboration with colleagues in the clinical departments.

The external localization of brain tumours using arsenic-74 as the radioactive tracer has proceeded according to schedule in co-operation with Dr. E. H. Botterell, Dr. T. P. Morley and Dr. W. M. Lougheed (Neurosurgery).

The facilities of the laboratory for the processing, handling and counting of radioactive isotopes have been fully utilized by clinical research projects. The recent addition of a liquid scintillation counter for the measurement of tritium and carbon-14 will greatly enhance the usefulness of the laboratory and extend the scope of investigations using radioactive tracers.

Dr. J. M. Finlay and Dr. S. M. Sumi (Department of Medicine) have continued to study the usefulness of iodinated triolein and oleic acid in the diagnosis of intestinal malabsorption.

Progress in the use of oximetry in the Cardiovascular Unit of the Toronto General Hospital has progressed satisfactorily. A panoramic unit for use in vector cardiography has been constructed in co-operation with Dr. H. Abramson (Medicine) in the Cardiovascular Unit.

Miss Amy Britton, in collaboration with Dr. C. Ezrin, Dr. B. Langer (Pathology) and Dr. D. Schatz (Medicine), has continued studies on radiothyroxine turn-over, radio-iodine chromatography and the incorporation of triiodothyronine into red blood cells.

PUBLICATIONS

- DAUPHINEE, J. A. "President's Address: Some Thoughts on Present Day Undergraduate Medical Education" (*Annual Announcement, The Medical Council of Canada*, 1958, pp. 27-30).
- GORNALL, A. G. "The Problem of Recurrent Abortion" (*Canadian Medical Association Journal*, vol. 80, no. 10, May 15, 1959, p. 832).
- KUMAR, D., FELTHAM, L. A. W. and GORNALL, A. G. "Aldosterone Excretion and Tissue Electrolytes in Pregnancy and Preeclampsia" (*Lancet*, vol. 1, no. 7072, March 14, 1959, pp. 541-5).
- NICHOLSON, T. F. "The Effect of Selective Damage to Various Parts of the Nephron on the Potassium Excreting Action of Aldosterone" (*Federation Proceedings*, vol. 18, no. 1, March, 1959, p. 114).
- "The Mode and Site of Action of Parathyroid Extract in the Dog" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, no. 1, Jan., 1959, pp. 113-17).
- NICHOLSON, T. F. and SHEPHERD, G. W. "The Effect of Damage to Various Parts of the Renal Tubule on the Excretion of Phosphate by the Dog's Kidney" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, no. 1, Jan., 1959, pp. 103-11).
- PAUL, WILLIAM. "Measurement of Photocell Stability" (*Institute of Radio Engineers, Canadian Convention Record*, 1958, pp. 208-10).
- "Oximetry" (*Institute of Radio Engineers, Transactions on Medical Electronics*, vol. 11, Professional Group on Medical Electronics, July, 1958, pp. 34-8).

PATHOLOGY

Under the direction of Professor J. D. Hamilton

The alterations in the curriculum begun two years ago have now been completed, with third-year teaching consisting of weekly tutorials to small groups of students under a senior instructor. For the first time, these groups received instruction at the New Mount Sinai, Women's College, Sunnybrook, and the Princess Margaret Hospitals as well as in the Hospital for Sick Children, and the other University hospitals. The programme was more successful in the first half of the year than in the last, possibly because there is no separate final examination in Pathology at the end of the third year. Some change in the programme during the last quarter may be instituted in the next session.

The transfer of Surgical Pathology to the Toronto General Hospital made it possible for Dr. Barrie to bring together in the space vacated, all those engaged

on the Autopsy Service. This has improved the efficiency of the Service by facilitating communications.

Dr. Anderson and his staff have found their new quarters in the Toronto General Hospital satisfactory although the separation from the Department has reduced their association with the staff in General Pathology. A good liaison is being retained through the weekly Surgical Pathological Conferences, which continue to be as successful and as well attended as they were in the past.

The Department was honoured by the visit of Dr. C. V. Harrison, Professor of Morbid Anatomy, Postgraduate Medical School of London, in May. Dr. Harrison gave a lecture on "Pulmonary Thrombosis and Embolism," which was well attended.

Dr. R. G. S. Malone is leaving the Department to assume a post with St. Joseph's Hospital, London, and with the University of Western Ontario. Dr. Malone contributed a great deal to the success of our group teaching, and to the investigation of neonatal deaths. His work in the latter field has set a high standard.

RESEARCH

Professor H. Z. Movat has continued his investigations of tissue lesions in hypersensitivity, most notably in glomerulonephritis, by means of electron microscopy. This project has been both experimental and clinical. In the clinical part, he has collaborated with Dr. R. Slater of the Hospital for Sick Children. Dr. D. D. McGregor has assisted with the production of nephrotoxic nephritis in dogs. In collaboration with Dr. J. W. Steiner, Professor Movat is investigating some of the more basic aspects of antigen antibody mechanisms in producing tissue injury. Several publications have already resulted from this work.

Dr. J. Steiner is working on the experimental production of auto-immune disease in the liver in rabbits, and to date has had some success in producing lesions. In collaboration with the Department of Medicine, Dr. Steiner has continued to examine sera from patients for anti-thyroid antibodies. This latter study is proving very productive and will be extended to a study of biopsy material.

The need for an electron microscope in the Department is becoming greater every day, not only because Drs. Movat, McGregor and Steiner are all engaged in using this technique as part of their experimental and clinical investigations, but also because requests for use of this technique are increasing from other departments. A grant has been approved to obtain an instrument in the near future.

Dr. G. F. Buckley continued his investigation of vascular lesions in amputated limbs and completed this study during the current session. He presented a paper on peripheral arteriosclerosis to the annual meeting of the Canadian Life Insurance Officers Association.

Dr. R. J. MacKay continued to work with Professor Fisher in the School of Hygiene on experimental pneumoconiosis.

Professor H. J. Barrie has continued his investigations of the kidney with special reference to intravenous herniation in hydronephrosis. Under his supervision, the following studies have been undertaken with members of the Autopsy Service: (1) with Dr. Leo Gosselin, a report on changes in the lungs of a man exposed to the dust of nepheline syenite (this is the first report of a pneumoconiosis caused by a rock dust that is entirely free from silica); (2) with Dr. C. D. Anderson, the studies on mitral insufficiency using the flowmeter have continued (a report of a case of pneumocystic carinii in an adult is being completed); (3) with Dr. A. J. Gelbloom, a study of the elastica in the bronchi in emphysema has been undertaken.

Dr. J. T. D. Ainslie, in collaboration with Dr. N. T. McPhedran of the Department of Surgery, has investigated the ampulla of Vater with regard to its detailed structure.

Professor William Anderson has continued his investigations of metabolic bone disease, radiation changes in bone and degenerative joint disease under grants from the National Research Council and the Canadian Arthritis and Rheumatism Society. Collaboration with various members of the Department of Surgery in investigations

has continued, specifically with the study of the blood stream dissemination of malignant cells, experimental tendon repair, and the study of killed dermis in surgical repair. Dr. D. W. Thompson and Dr. Anderson, in collaboration with the Department of Obstetrics and Gynaecology, are preparing a teaching atlas of pathology and also are making a collection of suitable material for a study set of the cytological diagnosis of cancer. An exhibit on the cytological diagnosis of cancer was prepared for the College of General Practice.

Dr. Calvin Ezrin's investigation into the pituitary and pituitary-thyroid relationship has continued and is proving more productive each year. Dr. Ezrin was awarded the Reeve prize for this work.

DIVISION OF NEUROPATHOLOGY

Reported by Professor M. I. Tom

Dr. E. A. Linell, Professor Emeritus, is continuing his experimental research on the Pathology of the Internal Ear and associated structures for the Defence Research Board of Canada.

Dr. Peter Lampert has made a study of hypersensitivity reactions in brain with special reference to a case of acute radiation necrosis of the brain.

In collaboration with Dr. W. M. Lougheed of the Department of Neurosurgery, Professor Mary I. Tom has been studying the tissue reactions following the introduction of blood into the subarachnoid space in dogs.

Dr. R. A. Chambers has been reappointed Research Associate in the Division. He is continuing his studies on the demyelinating diseases on a grant from the Multiple Sclerosis Society of Canada.

PUBLICATIONS

- ASZKANAZY, C. L., TOM, M. I. *et al.* "Encephalitis Presumably of Viral Origin, Associated with Massive Necrosis of the Temporal Lobe" (*Journal of Neuropathology and Experimental Neurology*, vol. 17, no. 4, Oct., 1958, pp. 565-70).
- AUGUSTINE, J. R. and JAWORSKI, Z. F. "Unusual Testicular Histology in 'True' Klinefelter's Syndrome" (*A.M.A. Archives of Pathology*, vol. 66, no. 8, Aug., 1958, pp. 159-64).
- BAIRD, R. J., ANDERSON, W. and MILLS, J. R. F. "Carcinoid Tumour in a Meckel's Diverticulum" (*Canadian Journal of Surgery*, vol. 1, no. 4, July, 1958, pp. 368-70).
- BLANCHARD, A. J. *et al.* "Hypersensitivity Myocarditis Occurring with Sulpha-methoxypyridazine Therapy" (*Canadian Medical Association Journal*, vol. 79, no. 8, October 15, 1958, pp. 627-30).
- BOYD, W. "George Lyman Duff: In Memoriam. (First Annual George Lyman Duff Memorial Lecture)" (*Canadian Medical Association Journal*, vol. 78, no. 12, June 15, 1958, pp. 962-3).
- EZRIN, C., SWANSON, H. E., HUMPHREY, J. G., DAWSON, J. W. and WILSON, W. D. "The Delta Cell of the Human Adenohypophysis: Its Response to Acute and Chronic Illness" (*Journal of Clinical Endocrinology and Metabolism*, vol. 18, no. 9, Sept., 1958, pp. 917-36).
- HAMILTON, J. D. "La Maladie coronarienne" (*Strasbourg Medical*, vol. 9, no. 11, décembre, 1958, pp. 905-6).
- "The Pathology of Primary Biliary Cirrhosis" (*Laboratory Investigation*, vol. 8, no. 3, May-June, 1959, pp. 701-22).
- KUMAR, D. and ANDERSON, W. "Malignancy in Endometriosis Interna" (*Journal of Obstetrics and Gynaecology of the British Empire*, vol. 65, no. 3, June, 1958, pp. 435-7).
- MAUTNER, L. S. "Vaginitis Emphysematosa" (*Canadian Medical Association Journal*, vol. 80, no. 8, April 15, 1959, pp. 643-7).
- MOVAT, H. Z. "The Concept of Fibrinoid" (*American Journal of the Medical Sciences*, vol. 236, no. 3, Sept., 1958, pp. 373-82).
- PRITZKER, H. G., LASKI, B., STEINER, J. W. *et al.* "The Effect of Nystatin (Mycostatin) on Neonatal Candidiasis (Thrush): A Method of Eradicating Thrush from Hospital Nurseries" (*Canadian Medical Association Journal*, vol. 79, no. 11, Dec. 1, 1958, pp. 891-6).
- SHERRY, J. B., MACDONALD, I. B. and ANDERSON, W. "Solitary Liver Nodules (Focal Cirrhosis)" (*British Journal of Surgery*, vol. 45, no. 194, May, 1958, pp. 581-3).
- STARKMAN, S. P., BROWN, T. C. and LINELL, E. A. "Cerebral Arachnoid Cysts" (*Journal of Neuropathology and Experimental Neurology*, vol. 17, no. 3, July, 1958, pp. 484-500).

PHARMACOLOGY

Under the direction of Professor E. A. Sellers

The teaching programme of the Department remained unaltered during the year. We are again grateful for the use of the Laboratories of the Attorney-General's Department for the Graduate Course in Toxicology. Members of the Laboratories and guest lecturers from the Department of National Health and Welfare, Ottawa (Dr. C. G. Farmilo, Dr. H. N. MacFarland, Mr. M. G. Almark) assisted in the Course.

During the summer the programme of Summer Research Scholarships was continued with the financial support of the Ciba Company, Burroughs Wellcome (Canada), the Welcome Fund, and Parke, Davis Co. Ltd. It is being carried on for the forthcoming year on a limited scale.

The machine shop is being moved to new quarters and the animal colony will utilize the space vacated. This will improve conditions in the colony considerably.

No major renovations have been made in the laboratories of the Department for a quarter of a century. A programme of improvement has been started which will ultimately involve all teaching and research laboratories. This is long overdue and is essential for the continued well-being of the Department.

Funds made available by the University, the Estate of the late Mrs. Leila Senkler, and by the Shouldice Clinic have been used for research equipment.

RESEARCH

Professor E. A. Sellers has collaborated with Professor E. Schönbaum of the Banting and Best Department of Medical Research in a study of tumours of the thyroid and factors which control their formation. He has also continued a collaborative study on atherosclerosis with Dr. D. G. Baker of the same Department. Dr. P. C. Dandiya completed one phase of a study on extracts of *Acorus calamus* of Indian origin, in which this drug was shown to have properties akin to reserpine. An investigation of the effects of environmental temperature on the toxicity of chlorpromazine and reserpine was also undertaken. The acute toxicity of reserpine is increased about nine hundred times at an ambient temperature of 2 or 3°C.

Mr. T. S. Konop completed an examination of the addictive properties of numerous narcotic drugs and established that an "addiction index" figure obtained using animals was of some value in predicting liability to addiction in humans.

Mr. H. Salem, with Dr. D. L. J. Bilbey of the Department of Anatomy, has investigated the effects of acute and chronic exposure of small animals to various air pollutants. The effects of "loading" the reticulo-endothelial cells on the toxicity of sulphur dioxide has received particular attention. Dr. J. B. Murphy has studied the relative toxicities of aerosols with different particle sizes. He has used substances with anticholinesterase activity in these experiments. It appears that particle size has considerable influence on the lethality of anticholinesterase.

Flight Lieutenant Russell Taylor, on leave of absence from the R.C.A.F., has studied respiratory and cardiac changes produced by high doses of procaine. The widespread use of this drug, and the occasional fatality associated with its use, have made it seem desirable to separate central and direct effects on cardiac tissue. The work is still in progress.

Professor W. Kalow has reviewed the fate and distribution of muscle relaxants for publication in a special issue of *Anesthesiology* and has completed studies on atypical cholinesterases, which work will be presented at the Ciba Symposium on Human Biochemical Genetics in Naples in May. He and Dr. A. Marton have continued enzymological studies of serum esterases; the results reflect an enzyme synthesis in liver. With Mr. R. Lee and Mr. N. Kerbel, he studied esterase in brain tissue during the summer of 1958. With Dr. R. O. Davies and with Dr. D. L. J. Bilbey, Department of Anatomy, he has studied certain "psychotic energizers" and has

observed changes in the adrenal cortex after amphetamine. In co-operation with Dr. D. R. Gunn of the Ontario Hospital, New Toronto, he continued to investigate undesired drug reactions in mental patients; with Dr. M. Szydlowski he has studied infections in rabbits and with Dr. R. O. Davies has made improvements in the assay of vitamin B₁₂.

Under the direction of Professor G. H. W. Lucas, Mr. Gordon E. Johnson was successful in his investigation of the extraction and identification of chlorpromazine from urine. He developed a method which enables any analyst to identify and estimate quantitatively chlorpromazine in the urine of patients in hospitals. Other tranquillizers of different chemical structure do not interfere. Mr. Murray Grossman is continuing his studies on the toxicity of greened potatoes. While the poisonous material developing in such potatoes may be solanine, adequate proof that such is the case is lacking. It is our hope that the toxic material may be isolated and identified. Dr. C. Fabierkiewicz is continuing her studies on the crystal and chromatographic tests for the various tranquillizing drugs on the market. Hundreds of tests have been made and much useful information has been obtained.

Graduate students have completed the following theses:

For the Ph.D. degree:

DANDIYA, P. C. Investigations on some pharmacological actions of *Acorus* oil, 5-hydroxytryptophan-amine, sympathomimetic amines, reserpine, and chlorpromazine.

SALEM, H. The phenomena associated with the respiration of aerosols and gases.

For the M.A. degree:

JOHNSON, G. E. Extraction and identification of chlorpromazine from urine.

KONOP, T. S. The relation between drug-induced excitation in the cat and addiction liability.

PUBLICATIONS

ASTON, R. "A Rat Diuretic Screening Procedure" (*Toxicology and Applied Pharmacology*, vol. 1, 1959, pp. 277-82).

ASTON, R. and CULLUMBE, H. "Studies on the Nature of the Joint Action of Ethanol and Barbiturates" (*Toxicology and Applied Pharmacology*, vol. 1, 1959, pp. 65-72).

——— "Therapeutic Ratios of a Group of Meprobamate-like Compounds" (*ibid.*, vol. 1, 1959, pp. 150-5).

DANDIYA, P. C., BAXTER, R. M. and CULLUMBE, H. "Studies on *Acorus calamus*: (I) Phytochemical Investigation" (*Canadian Pharmaceutical Journal*, Scientific Section, vol. 91, 1958, pp. 607-10).

DANDIYA, P. C., BAXTER, R. M., WALKER, G. C. and CULLUMBE, H. "Studies on *Acorus calamus*: (II) Investigation of Volatile Oil" (*Journal of Pharmacy and Pharmacology*, vol. 11, 1959, pp. 163-8).

DANDIYA, P. C. and CULLUMBE, H. "Studies on *Acorus calamus*: (III) Some Pharmacological Actions of the Volatile Oil" (*Journal of Pharmacology and Experimental Therapeutics*, vol. 125, 1959, pp. 353-9).

KALOW, W. and DAVIES, R. O. "The Activity of Various Esterase Inhibitors towards Atypical Human Serum Cholinesterase" (*Biochemical Pharmacology*, vol. 1, 1958, pp. 183-92).

LUCAS, G. H. W. and IMRIE, R. J. "Miscellaneous Poisonings, Acute"; in *Current Therapy*, ed. H. F. Conn, pp. 655-72. Philadelphia: W. B. Saunders. 1958.

MAYKUT, M. O. "A Reliable Colorimetric Method for the Quantitative Determination of Procaine in Human Whole Blood" (*Canadian Anaesthetists' Society Journal*, vol. 6, no. 2, April, 1959, pp. 159-68).

PHYSIOLOGY

Under the direction of Professor Charles H. Best

The teaching programme in this Department is overtaking the facilities available. The decision not to build a fifth floor or to complete the southeast wing of the Charles H. Best Institute has resulted in less teaching space being available than in

the old quarters in the Medical Building. The corridors and lecture room are being used for laboratory instruction. A document has been prepared showing the number of hours of teaching provided in the many different courses for which the Department is responsible. The total number of student laboratory hours is at present 38,071 and the total number of student lecture hours is 35,434. The completion of the southeast wing would make available the teaching space necessary for the immediate future.

Professor R. E. Haist took part in a symposium on the Biochemical Response to Physical Injury, organized by the Council for International Organizations of Medical Sciences at Semmering, Austria. He presented a paper "Islet Cell Function" at the New York Academy of Sciences Conference on Current Trends in Research and Clinical Management of Diabetes, in April, 1959. Dr. W. J. Linghorne presented a paper to the American Periodontal Association at Dallas, Texas, in November, 1958.

Physiological Society

The Society held fifteen Meetings during the year and addresses were given by the following speakers: J. Ashmore, Dr. I. A. Mirsky, Dr. R. F. Pitts, Dr. J. T. Shepherd, Dr. C. W. Sheppard and Dr. G. F. Wilgram from the United States of America; Dr. J. Bernstein from Australia; Dr. J. Christophe, Dr. B. N. Halpern and Dr. E. F. Pfeiffer from Europe; Dr. B. Delisle Burns of McGill University; Dr. W. H. Johnson of the Defence Research Board, and Dr. D. L. J. Bilbey, Dr. J. M. Finlay and Dr. Donald Fraser of this University.

Three of these speakers were appointed as Visiting Lecturers to this University by the School of Graduate Studies: Dr. B. Delisle Burns, Dr. I. A. Mirsky and Dr. J. T. Shepherd.

RESEARCH

Members of the staff have undertaken the following research work:

In Professor R. E. Haist's section, investigations on shock secondary to limb ischaemia included the effect of environmental temperature and humidity and chlorpromazine administration on body temperature and survival, by Mrs. Rebeka Moscarello and Mr. T. L. Friedlich; the effect of environmental temperature on the oxygen consumption of shocked rats, by Dr. M. A. Ashworth; on certain metabolic changes, by Dr. Rosemary D. Hawkins and Miss G. V. Kovacs; on glucose absorption and intravenous glucose tolerance, by Dr. Hawkins, Miss Kovacs and Mr. S. Livingstone; and on survival and certain metabolic changes in rats previously cold-acclimatized and then shocked, by Mr. Livingstone. Dr. Hawkins and Miss Kovacs studied the changes in hepatic glucose-6-phosphatase levels in shocked rats, and in non-acclimatized and acclimatized rats kept in slings at different environmental temperatures. With Dr. O. Sirek, they studied changes in this enzyme in the offspring of normal and diabetic rabbits and, with Dr. Anna Sirek, in animals given tolbutamide for long periods. With Dr. E. Schönbaum and Mr. S. Wong, they are investigating the effect of previous cold acclimatization on steroid production by the adrenals in ischaemic shock and the effect of environmental temperature on adrenal steroid production in non-acclimatized shocked rats. Mr. Wong has been investigating the effects of certain plant extracts and other substances on blood sugar level and sugar excretion in diabetic and normal rats and rabbits and the effect of the administration of some of these substances by mouth on the growth of the islets of Langerhans. A comparison of islet volume estimations using pancreas stained with dithizone and with neutral red is being made.

In Professor F. C. Monkhouse's section, Miss Florence McClain has continued to study the release of clearing factor by heparin and its inhibition by protamine. In collaboration with Dr. D. G. Baker (Banting and Best Department of Medical Research), these studies have been extended to include experiments on animals in the cold and animals on a fat diet. Mrs. Susan Milojevic, with Professor Monkhouse, has measured changes in coagulation factors and blood proteins in animals following

rapid and massive haemorrhages with transfusions of saline, dextran and modified plasma. Antithrombin, thrombin generation, prothrombin times and total proteins were measured up to eighteen days following the bleeding. Changes in plasma have also been studied following the infusions of thromboplastin and thrombin.

In Dr. J. Campbell's section, permanent diabetes has been produced in several dogs by the injection of purified growth hormone. The tolerances to glucose and the non-esterified fatty acids of the plasma and the responses to insulin of these animals have been determined before and during these injections and also in the permanently diabetic state. The study is still in progress. With Dr. P. R. Correa of the University of Rio Grande do Sul, Brazil, and Dr. G. A. Wrenshall (Banting and Best Department of Medical Research), the problem of the production of insulin by the pancreas has been approached by determination of the amount of insulin extractable from pancreatic tissue incubated *in vitro*. The pre-treatment of animals with growth hormone decreased the amount of insulin obtained on incubation of the pancreas tissue. With Mr. Harvey Socol and Mr. G. R. Green, a method for the determination of relative rates of production and of utilization of citrate by tissues *in vitro* was developed. No alteration of these rates was found when rats were exposed to cold. The liver tissues of diabetic dogs produced and utilized citrate at reduced rates. Dr. Hans Hausler has continued his studies on the ocular complications of diabetes. His full report will appear under the Department of Ophthalmology.

Professor J. Markowitz, in co-operation with his group at the Ontario Veterinary College, has been studying the bacteriology of the canine liver under varying conditions of arterialized hepatic blood supply. It appears that the over-arterialized liver loses its anaerobic tenants. It will be interesting to learn whether the surviving de-arterialized liver readmits anaerobes weeks after treatment with antibiotics has been suspended.

In Professor J. W. Scott's section, Mr. R. G. Black has continued the development and testing of suitable electronic equipment for recording electromyograms and the precise study of strength duration curves. With the assistance of Dr. Marianne Seger, this equipment has been tested and a series of normal and pathological electromyographic patterns recorded. Mr. Kenneth Money, in association with Professor Walter Johnson, has undertaken a study of the autonomic changes produced by vestibular stimulation. Dr. W. J. Finlayson has continued the study of urinary reflux in the ureters of paraplegic animals.

In Professor A. M. Rappaport's section, Dr. Pierre Potvin has studied the effect of arterial autoperfusion of the liver on its rate of detoxication of infused ammonium salts. Although there is not a significant drop in the level of blood ammonia, the output of urea by the liver increases with the augmented arterial blood flow. Ammonia changes the electro-encephalographic pattern only at unusually high and toxic blood concentrations. The study on hepatic fat phanerosis has been extended to the continuous perfusion of the excised liver. Experiments are in progress with prolonged continuous portal infusion of living rats with saline via the mesenteric veins.

In Professor D. W. Clarke's section, Dr. N. Forbath has completed some studies on a new oral hypoglycaemic agent, phenethylbiguanide. The results of this work give additional information regarding the process by which certain tissues use glucose. Additional studies on some sulfonylureas have shown that, if they are administered for a period of time, they may cause a slight increase in the level of muscle glycogen. This is one of the few observations which suggest an increased peripheral insulin-like activity of blood, following administration of these drugs. Mr. R. Evans has completed his studies on the effect of ethyl alcohol on carbohydrate metabolism in the rat.

Dr. Otakar Sirek, in collaboration with Dr. Anna Sirek and Miss Donna Muirhead, has continued his studies on offspring of alloxan-diabetic rabbits. By comparing newborns of normal and of diabetic animals it was found that the latter had low plasma levels of albumin, cholesterol and protein-bound hexose. The birth weight of these newborns was also found to be low. Similar studies have been initiated in new-

borns of diabetic mothers in collaboration with Dr. Joslyn W. Rogers from the Department of Obstetrics and Gynaecology.

Dr. W. J. Linghorne, assisted by Mrs. E. Gunzl, is continuing his work on the structures that connect the teeth with the maxilla and mandible. The factors that determine osteogenic rather than a fibrous repair and the role of the various elements necessary for osteogenic repair are being studied. In the past year he has been investigating the essential role of the periosteum in the healing of fractures of long bones. His findings indicate that in certain fractures largely involving compact bone, the periosteum plays an essential role in inducing a bony union. He is also working on the development of methods for inducing osteogenic repair in the healing of wounds open to the surface where ordinarily fibrous repair occurs. Encouraging results have been obtained by replacing the blood clot with a more readily available material.

Graduate students have completed the following theses:

For the M.A. degree:

BRENT, H. P. Changes in cerebral function induced by acceleration in the human centrifuge and by changes in oxygen partial pressure.

EVANS, R. L. The effects of alcohol on carbohydrate metabolism in the rat.

MONEY, K. E. Relationships between vestibular activity and the autonomic nervous system.

For the Ph.D. degree:

DAVIDSON, I. W. F. Some metabolic effects of glucagon.

GILLESPIE, R. J. Studies of factors responsible for hepatic damage in rats ingesting alcohol.

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MONKHOUSE, F. C. and MACKNESON, R. G. "A Controlled Assay of Clearing Factor, and Its Application in Studies of the Role of Heparin in Clearing Factor Production" (*Canadian Journal of Biochemistry and Physiology*, vol. 36, Oct., 1958, pp. 1065-74).

RAPPAPORT, A. M. "The Structural and Functional Unit in the Human Liver" (*Anatomical Record*, vol. 130, April, 1958, pp. 673-89).

SCHACHTER, H., SIDLOFSKY, S., BAKER, D. G., HAMILTON, J. R. and HAIST, R. E. "The Effect of Previous Exposure to Cold on Shock Secondary to Limb Ischaemia" (*Canadian Journal of Biochemistry and Physiology*, vol. 37, Feb., 1959, pp. 211-23).

PSYCHIATRY

Under the direction of Professor A. B. Stokes

Much has been written and said about the problems of education in this era of technical accomplishment. The core of concern seemingly lies in the difference between training and education, a difference which is important for every department of the Medical Faculty, and for Psychiatry in particular.

It is particularly important for Psychiatry because Psychiatry has been late in its technical development, although offering a prospect of tremendous advances in the

future. As with a gifted youngster, there is danger in expecting too much virtuosity before a reasonably maturity. The clamour is for the immediate exhibition of prowess in all sorts and kinds of psychiatric services, whereas the silent inner need is to study, reflect, test and consolidate that which is true.

Training and education are not to be contrasted as separable processes: rather training emerges from education, as action does from thought. But thinking has the primacy in human adaptation, giving meaning to experience and allowing appropriate action. Education achieves a proper understanding at the expense of time and pains. Training, with meagre educational roots, is merely a stereotyped technical skill, soon outmoded and deprived of vital effectiveness.

For Psychiatry the questions continually recur: How can Psychiatry be fostered as a developing body of knowledge? Who, away from the vociferous public demands for treatment services, is exploring, testing, thinking, trying out new ideas from which newer, more economical and more effective treatments will emerge in the future? How can the psychiatrists of tomorrow be encouraged to go beyond the expedient techniques of today? In relation to these questions, one must remember that the living of both teachers and graduate students is dependent, almost wholly, on service remuneration and in-service training grants; that there is a near bankruptcy of time for the full fruition of the teacher-pupil relationship; and that careful study within the doctor-patient relationship suffers the interruptions of urgency.

These questions, and the related circumstances, must not be given an exaggerated emphasis. University hospitals and clinics, through their various administrations, are very aware of the problems and seek collaboratively with the University a reasonable compromise between current service responsibilities and long-term educational needs. Nonetheless, the balance requires continual attention with adjustments most often to increase the educational weighting.

In this regard it is tremendously encouraging to report that the Provincial Government has announced, through the Prime Minister and the Minister of Health, its intention to build a new Psychiatric Hospital and Institute near the University. Here, on the firm foundation of exemplary service, educational and research efforts in Psychiatry will have full opportunity to match the highest standards anywhere. It is a pleasure to pay tribute to the Government, Community and University leadership that has brought about this development.

The new Psychiatric Hospital and Institute, apart from its own opportunities, will influence the whole development of the Toronto Metropolitan psychiatric services. As was reported last year, some sixteen service units form a network of clinical facilities, associated with the programme of teaching and research in Psychiatry. Each will be quickened in lively initiative and enthusiastic devotion to the problems and tasks that lie ahead.

The number of graduate physicians enrolled with the Department of Psychiatry for specialist education totals fifty-five, a notable professional force, which also contributes to services. Of these, twenty-five were successful, after two years of graduate studies, in the 1959 Diploma examination. Of the diplomates of past years, nine were successful in the Certification examination of the Royal College: one member was elected by examination to the Fellowship of the Royal College.

The arrangements for graduate education in Psychiatry have been under review for the past two or three years by a working committee, under the chairmanship of Dr. A. Miller. Each service unit is examining critically its educational climate and its methods of teaching in order to improve them. The central courses of instruction at the Toronto Psychiatric Hospital are also being surveyed particularly to avoid spoon-feeding and to promote a robust maturity of thought and action in the psychiatrists of the future.

The contribution of the Department of Psychiatry to the undergraduate medical curriculum has also been actively surveyed by a working committee, under the chairmanship of Dr. W. E. Boothroyd. The dangers of specialist attitudes in the teachers have been faced squarely with a consequent emphasis on the proper use of human

abilities in helping emotionally disabled people. As a corollary, much greater general emphasis is given to knowledge of human development and the interplay of physical, psychological and social events in determining attitudes, feelings and behaviour.

The third- and fourth-year programmes have been recast so that students may work with patients, under adequate supervision. Consequently, for the first time, it has been possible, in the final year, to conduct a clinical and oral examination, in addition to the written papers. A strengthening of the first- and second-year curriculum is now under consideration.

In addition to graduate and undergraduate instruction in Psychiatry, intramural teaching has continued for nurses, psychologists, social workers, occupational therapists, speech therapists and others. Extramural teaching activities have also been carried out, particularly in connection with Rorschach techniques, psychiatric social work and pastoral counselling. Much more requires to be done in the serious study of preventive processes, particularly as they may be discerned in family groupings and child development.

The Library facilities at the Toronto Psychiatric Hospital continue to expand. The generous support of the Minister of Health of the Province of Ontario and his staff, in this and many other areas of growth, is gratefully acknowledged with the warmest appreciation for the co-operative endeavour involved.

The R. Samuel McLaughlin Foundation, the McLean Foundation, the Bursary Committee of the Medical Alumni Association and many private donors have accorded most generous help to the educational programme. At present three senior students are completing their studies in overseas centres.

Over the academic year 1958-9, there have been some worries and many enjoyments associated with partnership in the University Medical Faculty. Wise counsel and helpful support have always been readily available in times of need; intellectual provocation and incentive to action have always been an essential part of this partnership.

RESEARCH

The research activities of the Department of Psychiatry are various: they involve natural phenomena of different orders, many separate disciplines and disparate tools of measurement. This variety is related to an active clinical teaching centre, where the genetic, physical, psychological and social aspects of psychiatric illness are continuously under observation. Despite a seeming hotchpotch there is an emphatic relatedness in the mixture when considered in terms of a scientific approach to human breakdown in living.

A new *anatomical* laboratory has been instituted for the study of the structure of the limbic lobe and its relations. Work in this area is significant for feeling tone function. Dr. H. Husdan has continued his *biochemical* studies on serotonin in blood platelets. The techniques of measurement reveal difficulties which are obscured in the literature and which disallow too ready an acceptance of some of the reported findings. Mr. B. Eglitis has been similarly concerned with the techniques of measuring the output of the catechol amines in the urine. He has evolved a method, the reliability of which offers greater confidence in future studies.

The kinetic *metabolic* investigation of patients with periodic or recurrent psychotic illnesses has continued in conjunction with the Department of Pathological Chemistry. No new break through can be reported, although the elements of hormonal interrelations have become a little clearer.

Dr. J. W. Lovett Doust, with his group, has pursued his enquiries into capillary *physiology* and autonomic responsiveness in various groups of psychiatric patients. Much of this work has been done in collaboration with the staff of the Ontario Hospital, Toronto. A clinical research division has been organized at this hospital under the auspices of the Provincial Department of Health. The services of Dr. D. Naidoo have been secured in conjunction with this development.

Over the past year a number of new medications have been carefully investigated as to physiological and psychological effect. A drug research committee, under the chairmanship of Dr. Lovett Doust, has planned and carried out these investigations in association with the Ontario Hospital, Toronto, and other service units. The firms of Geigy, Sandoz and Hoffmann-La Roche have each contributed financially to the research endeavour.

Dr. B. Quarrington and Dr. S. Neiger are bringing their reappraisal of the Rorschach test to a conclusion. These *psychological* studies will provide a reliable instrument for future clinical research: thus pathological indices from Rorschach data have been developed with the emergence of several efficient, discriminatory scales. With Mr. E. Douglass, Dr. Quarrington has undertaken a dimensional analysis of stutterers. Five factors have been abstracted from the test data which account for the major variation that occurs between stutterers. The psychologist group has also undertaken preliminary longitudinal studies of mood alteration and behavioural correlates.

Dr. H. Hutchinson and his colleagues in the forensic unit are continuing their work on the diagnostic study of sexual disorders by means of objective tests.

Psychodynamic and *psychopathological* enquiries are making progress. The variants of phantasy and their relation to perceptual disorders are the primary concern of Dr. D. Cappon and his junior colleagues.

The features of small groups and the factors involved in interpersonal communication are under *sociological* study by Dr. T. Mallinson and Mr. F. Toombs respectively. These studies have relevance to the effectiveness of group methods of treatment.

Clinical studies have been as active as the instrument and laboratory enquiries. Dr. W. R. Mitchell, on a limited material, is investigating the effect of progesterone on puerperal psychoses. He and Dr. A. Bonkalo are attempting to discriminate diagnostic groups, using electro-encephalography in conjunction with psychopharmaceuticals.

The psychiatric unit at St. Michael's Hospital (Dr. D. J. Lewis) continues to test mood-altering drugs. Dr. D. J. McCulloch, in the out-patient service of the Ontario Hospital, Toronto, has furthered his studies on the effect of psychotherapy. Dr. J. D. Armstrong is studying the problems of alcoholism from a number of clinical angles.

In short, the research endeavours of the Department of Psychiatry have the qualities of hard work, obstinate endurance and pedestrian progress. But with a continuing good critical thinking, future judgment may deem them very worthwhile.

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- "Psychosomatic Aspects of the Common Cold: A Preliminary Report" (*Canadian Medical Association Journal*, vol. 79, no. 3, Aug. 1, 1958, pp. 173-80).
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- DEWAN, J. G. and SPAULDING, W. B. *The Organic Psychoses: A Guide to Diagnosis*. Toronto: University of Toronto Press, 1958. Pp. 170.
- DOUGLASS, E. and RICHARDSON, J. C. "Aphasia in a Congenital Deaf-Mute" (*Brain*, vol. 82, part 1, March, 1959, pp. 68-80).
- FARRAR, C. B. "An Appreciation of the Psychiatric Nurse" (*Nursing Outlook*, vol. 7, no. 5, May, 1959, pp. 286-7).
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- PERRETZ, E. "Social Work in Mental Hospitals" (*Canadian Welfare*, vol. 34, no. 4, Nov. 1, 1958, pp. 173-7).
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RADIOLOGY

Under the direction of Professor A. C. Singleton

There has been no change in the teaching programme at the undergraduate or postgraduate level. The course leading to the Diploma in Medical Radiology continues to attract a good type of candidate for training and four trainees received their Diploma in Medical Radiology this year.

Dr. D. G. Wollin has resigned from the University to enter practice in Calgary. He is being replaced on the staff by Dr. G. Wortzman.

The addition of three radiologists to the staff of the department of St. Michael's Hospital has resulted in a definite increase in the value of teaching.

The clinics in Diagnostic Radiology to the final-year undergraduate students continue to be well attended in all of the hospital departments.

The opening of the Princess Margaret Hospital with its greatly expanded facilities for radiation therapy has led to great improvement in the teaching facilities for radiotherapy and is already attracting a definitely increasing number of postgraduate students. In all of the University teaching hospital departments there is increasing participation in teaching with other departments in the form of combined attendance of radiologists at clinical conferences of other departments.

RESEARCH

Members of the staff have undertaken the following research work:

Dr. J. D. Munn has been continuing his research in investigation of pyloric stenosis and also in the development and pathological processes involving middle ear and mastoids, and also a research grant has been obtained from the Dominion Government (National Federal Health Grants) for the study of congenital dislocation of the hip as far as the genetics and effects of radiation and functional results are concerned.

Dr. L. R. Harnick is conducting research on the movements of the lumbar spine in normal people and people with low back pain by means of cineradiography.

Dr. K. E. Hodge is conducting an investigation into the problems of excretion urography in older people. Dr. Hodge is also conducting a study of renal morphology in its relation to ureteric obstruction. He is continuing investigation into the mechanisms of the effectiveness of spinal traction in the treatment of lesions of the cervical spine.

Dr. W. D. Rider and associates have been conducting research into the systemic effects of acute radiation.

Dr. O. H. Warwick has been conducting research into disturbances of calcium metabolism in metastatic bone disease, and also the investigation and treatment of malignant effusions.

Dr. W. E. C. Allt and associates have been conducting research in the use of bone marrow transfusions as an adjunct to treatment with radiation or chemotherapy.

Professor H. E. Johns and Dr. W. E. C. Allt have been making a comparison of treatment with 24 Mev X-rays and cobalt-60 in advanced cancer of the cervix. They have also been conducting research into radiation hypophysectomy.

Professor H. E. Johns and associates have been conducting research with the development of body scanning techniques.

Dr. R. B. Holmes has been conducting research in radiology in assessment of renal arterial lesions. He has continued his studies on radiological findings in splenoportography. He has also studied the infundibular region of the right ventricle with reference to anatomic stenosis *versus* work hypertrophy.

Dr. D. E. Sanders and others have been conducting research in cystourethrography in stress incontinence. They have also studied mediastinal and pulmonary angiography as an aid in determining the resectability of primary lung cancer.

Dr. D. E. Sanders has studied the value of barium examination of the upper intestinal tract in carcinoma of the head of the pancreas.

PUBLICATIONS

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SURGERY

Under the direction of Professor F. G. Kergin

Attention continues to be directed to co-ordinating more closely the undergraduate teaching in the four teaching hospitals.

A major preoccupation of the department is the organization and operation of the University of Toronto Postgraduate Training Course in Surgery. All the resident appointments in general surgery and the specialties in the Toronto General Hospital, St. Michael's Hospital, the Toronto Western Hospital, the Hospital for Sick Children and Sunnybrook Hospital (DVA), are filled from the members of the training course. The period of training is at least four years beyond rotating internship and is designed to fulfil the requirements for the Fellowship examination of the Royal College of Physicians and Surgeons of Canada. About eighteen members are appointed each year and the total number of surgeons-in-training in the course is ninety. This number includes graduates of almost all the Canadian medical schools as well as a small proportion of graduates from foreign schools.

Members of the Department continue to take an active part in postgraduate teaching, both in various courses organized in Toronto and in the decentralized clinics. The Second Annual Postgraduate Course in Fractures and Trauma, organized by the members of the Orthopaedic Divisions of the teaching hospitals, was received enthusiastically and this course is now firmly established on an annual basis.

On November 8, 1958, the new Neurosurgical Unit of the Toronto General Hospital was officially opened immediately following a meeting in Toronto of the American Academy of Neurosurgery. Among the distinguished visitors who came to give the Unit their blessing were Sir Geoffrey Jefferson and Dr. Wilder Penfield, O.M. President Bissell and Dr. K. G. McKenzie also spoke at the opening ceremony.

Mr. David Patey, Director of Surgical Studies at the Middlesex Hospital, spent the month of October as a visitor to the Department of Surgery under the exchange arrangement with that hospital. During his visit he participated actively in undergraduate teaching, made rounds in all the teaching hospitals, and shared intimately in all the activities of the Department.

Professor Benjamin Rank of Melbourne, whose special interest is plastic and reconstructive surgery, visited the Department for fifteen days during the month of November. He delivered the Balfour lecture on November 10, on the subject of "Cutaneous Malignancy—Hazards of Diagnosis."

Dr. J. H. Couch retires from the position of Assistant Professor at the end of this year to become a Graduate Lecturer and to continue in private practice. Dr. Couch has been a member of the active staff of the Toronto General Hospital, attached to the First Division of General Surgery, for thirty-one years, and during that time has influenced many medical students by his colourful teaching.

A University of Toronto Kidney Research Fund, under the control of this Department, has been created through the generosity of Mr. Benjamin Fish and is being maintained by other donations.

RESEARCH

CARDIOVASCULAR SURGERY

Dr. W. G. Bigelow, in collaboration with a team of investigators led by Dr. Alan Trimble, has continued the study of hibernation and its possible application to cardiovascular surgery.

Dr. R. O. Heimbecker, with the assistance of Dr. W. E. Young, has continued his studies on the effects of extracorporeal circulation. The currently used pump-oxygenator has been modified and improved; by the use of a heat exchanger experimental use of deep hypothermia combined with extracorporeal circulation is being investigated; micro-embolism during extracorporeal circulation has been studied using the quartz rod technique. Clinical studies in association with Dr. R. Gunton are being pursued to improve methods of assessing mitral and aortic valve lesions by left heart catheterization and the use of dye dilution curves.

Dr. J. A. Key, with the assistance of Dr. E. P. Farber, has continued a long-term study of the fate of arterial prostheses in the experimental animal. They have also conducted a clinical follow-up study of patients who have been treated for occlusive arterial disease by various replacement and by-pass procedures. Attempts to revascularize the myocardium by tapping the left ventricle have been unsuccessful.

Dr. W. T. Mustard, with the assistance of Dr. Claude Brunet, has continued the investigation of blood-clotting mechanisms following extracorporeal circulation. Long-term studies on the effect of growth on anastomoses of major vessels in the experimental animal are being conducted. An experimental approach to the clinical problem of transposition of the great vessels has been designed.

GENERAL SURGERY

Dr. D. J. Currie is continuing his study of factors which can produce cholecystitis in the experimental animal.

Dr. Norman Delarue, with the assistance of Dr. R. H. N. Fielden, has pursued a number of projects. In co-operation with the American Cancer Society, a randomized study is being done of the effects of adjuvant chemotherapy in the surgical treatment of lung cancer. The study of the effects of preoperative irradiation in breast cancer has been completed and a report is in the process of preparation. Investigation of the incidence and significance of circulating cancer cells in patients suffering from malignant disease has been expanded and Dr. Neil Watters, of the Wellesley Division of the Toronto General Hospital, is participating in the investigation. The significance of pulmonary angiography in assessing operability in lung cancer continues under study in collaboration with Dr. D. E. Sanders of the Department of Radiology.

Dr. G. H. C. Joynt continues his attempts to produce cystic disease and emphysema in the experimental animal by the use of endobronchial valves. With Dr. R. C. Laird, he has made a clinical study of the results of producing pleural symphysis by kaolin in armed service patients suffering from spontaneous pneumothorax.

Dr. J. E. Mullens has investigated the popular belief that consumption of the herb common comfrey has a favourable effect on the healing of fractures. He has tested the effect of the herb on healing of fractures in the experimental animal and concludes that this is an old wives' tale.

Dr. J. A. Palmer has completed a long-term follow-up study of the results of various kinds of operation for massive prolapse of the rectum. This investigation has been amplified by an anatomical study of the structures involved in this condition.

Dr. W. J. E. Spence, working in conjunction with Dr. J. M. Finlay of the Department of Medicine, has continued an investigation of fat absorption in various diseases of the gastrointestinal tract and after a variety of surgical procedures. In this research they have had the assistance of Dr. Austin Wheatley, an exchange Fellow in the Department of Surgery from King's College Hospital, London, England.

NEUROSURGERY

Dr. E. B. Hendrick is investigating the use of yttrium-90 as a means of destroying the globus pallidus and ventro-medial nuclei of the thalamus in patients with

dystonia musculorum deformans, and also the experimental production of cranial synostosis.

Dr. W. J. Horsey, in collaboration with Dr. C. Ezrin of the Department of Medicine and Dr. Bernard Langer, continues an experimental investigation of hypothalamo-hypophyseal relations.

Dr. T. P. Morley, having developed a successful technique for growing gliomas and other intracranial tumours in tissue culture, is attempting, so far without success, to transplant either fresh or cultured tumours of human origin to experimental animals. He has undertaken an investigation of the incidence of circulating tumour cells in the blood of patients suffering from brain tumours.

Dr. W. J. Scott, with the assistance of Dr. W. J. Finlayson, has continued his study of ureteral reflux in paraplegic animals. He continues his development of apparatus for electromyography.

ORTHOPAEDIC SURGERY

Dr. W. R. Harris, with Dr. W. P. Bobechko, has pursued his study of experimental fat embolism. They have also engaged in a histological study of experimentally produced avascular necrosis of bone designed to elucidate the significance of the apparent increased radiographic density of avascular bone.

Dr. R. B. Salter, working in the Research Institute of the Hospital for Sick Children, has completed an experimental investigation of the effects of continuous compression on articular cartilage. A large scale follow-up study of the late results following treatment for fractures involving the elbow joint in children has been completed.

PLASTIC SURGERY

Dr. S. D. Gordon, in association with Dr. J. A. Key and Dr. E. P. Farber, has continued a long-term experimental study of the fate of treated dermis grafts used as substitutes for segments of the aorta. In association with Dr. W. S. Anderson, he is studying the histological changes in treated dermis buried in the tissues of rabbits.

Dr. W. K. Lindsay, in collaboration with Dr. G. P. Walker and Professor S. H. Bensley, has carried out, in the Research Institute of the Hospital for Sick Children, a very extensive study of the factors which influence healing of experimentally produced lesions of flexor tendons. He is making a clinical study of the late results of the treatment of cleft lip and palate and investigating operative procedures on the pharynx designed to improve speech in these patients.

Dr. D. C. Robertson is investigating the viability of transplanted tendons under various conditions.

UROLOGY

Dr. W. K. Kerr, with the assistance of Dr. V. N. Kyle, has continued a clinical and experimental study which has resulted in an improved method for the quantitative control of the electrolyte aberrations in patients subjected to ilio-cystoplasty. A technique has been devised for the determination of renal blood flow by thermal exchange measurements. An extensive investigation of a new technique for measuring serum acid phosphatase has failed to show improvement over orthodox methods. A review of five hundred patients treated for carcinoma of the cervix at the Ontario Cancer Institute has been completed and shows that 28 per cent developed involvement of the bladder and ureter. With Dr. G. Gale, of the Toronto Hospital for Tuberculosis, Dr. Kerr has done a follow-up study of 818 patients treated for genito-urinary tuberculosis and demonstrated a decrease in the ten-year mortality from 50 to 4 per cent.

Dr. G. Ranking, with Dr. C. M. Spooner and Dr. J. D. L. Fitzgerald, has continued a study of renal disease by renal biopsy.

Dr. J. L. T. Russell continues his clinical study of uretero-intestinal transplants with special reference to the sigmoid bladder.

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THERAPEUTICS

Under the direction of Professor K. J. R. Wightman

The teaching of therapeutics to undergraduates continues to be a most difficult task. It is obviously never accomplished until the student has reached a position of personal responsibility for the care of patients. Before this time, all that can be done is to try to equip him with some knowledge of the principles involved, and a somewhat critical attitude toward the evaluation of results obtained. The scientific aspects of treatment are multiplying so rapidly as to eclipse any interest in the so-called art: this latter is difficult to define, ranging in various minds from refinements of the bedside manner to the rational approaches of psychotherapy. To some people it means making the patient feel better without doing anything which is actually helping his disease; on the other hand there is an "art" in the manipulation of quite potent and dangerous agents, in the sense that one learns to make correct decisions which cannot always be explained on rational grounds. All in all, the concept probably includes some of all these elements, and is only helpful to the student if it gives him a sense of responsibility for making use of all conceivable means of helping his patient, and for continuing this effort even when a cure of his disease is manifestly impossible.

As for the patient whose illness is not fatal we find increasing interest in the concept of rehabilitation, by which is meant the employment of all possible methods to produce restoration of function as rapidly as possible. This is part of the work of every doctor who treats patients, but in certain situations a specialized approach may be useful. For this reason there has been serious discussion of the advisability of establishing a separate division of rehabilitation medicine to encompass all the disciplines which might be involved in such an endeavour.

The teaching programme in third year has been assisted by Dr. M. A. Ogryzlo of the Department of Medicine, and in the fourth year Dr. J. W. Digby, Dr. M. A. Malyon and Dr. M. J. B. Stalker have given practical demonstrations which were appreciated by the students.

RESEARCH

Studies on the pathogenesis of anaemia have been carried on by Dr. H. J. Watt. We have been interested in the behaviour of the plasma volume in various types of anaemia. The sequestration of red cells in the spleen has also been studied, using radioactive chromium. This work has been assisted by the Ontario Cancer Treatment and Research Foundation. Investigations on Royal Jelly are being carried out in collaboration with workers at the Ontario Agricultural College. This work will continue with the aid of a Public Health Grant.

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PHYSICAL AND OCCUPATIONAL THERAPY

Under the direction of Dr. A. T. Jousse

The therapeutic value of physical and occupational therapy in the treatment and rehabilitation of persons who are suffering from physical and mental illnesses continues to gain a wider appreciation. As a consequence, there are an increasing number of positions available to the graduates each year and a growing number of vacancies left unfilled. Many solutions have been suggested as a remedy for this problem of too few trained personnel. These recommendations have included both a shortening of the course of training and a lengthening thereof with higher standards of admission and the granting of a degree on graduation. The wisest plan would surely be to increase the number of university schools of physical and occupational therapy in Canada. It is therefore encouraging to learn that at two universities such action is being considered. In support of these hoped-for developments more teachers will be required, and we are encouraged, therefore, in our efforts to develop and train teachers.

At present one young woman is enrolled in the teachers' training programme and has completed her first year. She is bilingual, and when her training is completed will occupy a teaching position at the University of Montreal.

Miss Gertrude Watts resigned from the teaching staff in occupational therapy on July 1, 1958, in order to be married. Her valuable contribution to the teaching programme was well recognized and greatly appreciated. Her place was taken by Miss Roma East, who brought with her an excellent background of experience in rehabilitation work both in this country and in Britain. A later addition to the staff on January 1, 1959, in the person of Miss Joan Crosby, lent further strength to the teaching of occupational therapy. Before taking up her duties, Miss Crosby travelled to Britain and the continent in order to observe the work in rehabilitation centres in those areas.

The opening of the new Department of Physical Medicine and Rehabilitation at the Toronto General Hospital during the past year improved the clinical facilities for teaching. Miss Adele Colthurst became a member of the physiotherapy staff of the Toronto General and assumed supervision of the students who were allocated to that hospital for clinical work. This plan has proven valuable and has led to better integration of the teaching and clinical programmes of training.

Miss Ruth Bradshaw has been granted leave of absence to attend McGill University, where she will complete the required work for a degree in Physical Therapy. When this objective has been achieved, she will return to the teaching staff at Toronto. Her position in the meantime will be filled by Miss Sally Morgan, a graduate in Physical Therapy of Toronto, who has had a varied experience in this country and in Britain. She became a qualified teacher of physical therapy at St. Thomas' Hospital in London, England.

The teaching programme is thus well developed, and with this number and quality of staff, nearly twice as many students could be taught each year as are now enrolled. It remains, therefore, to interest more secondary school students in physical and occupational therapy as a career of service.

A two-year postgraduate course in Speech Pathology and Audiology, under the direction of Dr. C. M. Godfrey, was instituted in the Faculty of Medicine in 1958-9.

This course was offered in response to the need for more workers in the rehabilitation field who could treat speech and hearing disorders. Seven candidates were enrolled and have now completed the first year of study. There is an equally favourable enrolment for the coming autumn.

The course includes lecture demonstrations in anatomy and physiology and lectures in psychology, psychiatry and audiology. Special stress was laid on the role a speech therapist plays on the rehabilitation team. This was furthered by twenty-four lectures in surgical and medical conditions with symptoms of disordered communication. The various fields of speech pathology including dysphasia, stammering, cleft palate, articulation problems, cerebral palsy and disorders in rhythm and voice were considered in lecture-demonstrations. Students were assigned clinic work early in the year.

BANTING AND BEST DEPARTMENT OF MEDICAL RESEARCH

Reported by Professor Charles H. Best

Members of the staff have undertaken the following research work:

Professor C. C. Lucas and Dr. Jessie H. Ridout with Dr. Jean M. Patterson, working under the general direction of Professor Best, have studied the effect of the nature of the dietary protein on the distribution of stainable fat appearing in the livers of rats. Diets that had produced mainly a periportal distribution in monkeys failed to do so in rats. This failure necessitates a re-evaluation in different species of the diets used in these studies. Using Zak's micro-method for cholesterol, it has been shown that the frequent withdrawal of small samples of blood does not alter the total serum cholesterol of rats. This has permitted a study to be made of daily changes in blood cholesterol on different dietary regimens. In studies of cirrhosis of dietary origin, a hypolipotropic ration containing 15 per cent protein has been evolved which permits good growth and long survival, and which results in moderately severe cirrhosis without premature degeneration of the vascular system. With Mr. R. J. Gillespie, a study has been made of the effects of single intoxicating doses of alcohol, at different dilutions, upon the gastrointestinal mucosa and stainable hepatic lipids of rats.

In Professor W. R. Franks' section, cancer research has been continued with the assistance of Miss A. McGregor, Miss M. M. Shaw and Mr. J. Skublics. The restoration of a tumour-resistant state in animals which lack, or have lost, this faculty and developed tumour growths is being studied. Experiments have been directed toward the destruction of the tumour host's susceptible lymphoid system (by X-ray, etc.) and the substitution of one derived from an alternative animal with induced resistance to the host's tumour. This can be accomplished provided the tumour-immune lymphoid graft and the host are mutually tolerant. Some success has now been found with isologous carcinogen tumours growing in the strain of mice in which they arose. Suitable experimental techniques of using the same approach to autologous (clinical) tumours are being applied. The problems are many: for instance, if host tolerance fails, anaphylactic death may result from the immune graft. During this work, some mice induced to become resistant to certain solid tumours, later developed a leucosis disease of low malignancy in cells of the reticulo-endothelial system. In certain instances, this disease can be propagated by cell-free tumour filtrates, but no solid tumours have yet been induced. This factor, presumably derived from the tumour, thus behaves as an incomplete virus (like prophage) lacking the invasiveness required to produce cancer in somatic cells, but able so to act in the cells entered by phagocytosis. The disease remains latent in resistant animals but may develop in later life, presumably after the animal's resistance has been lowered, thus resembling clinical cancer. It can be contagious. Some hormone dependence is indicated by the higher incidence of the eventual disease in females of mice injected at birth. It is inhibited

by cortisone. With Mr. C. S. Lennox and Miss Janet Chisholm, the test for the post-mortem detection of hypoxia as a cause of death in accidents has been continued. In asphyxia, the concentration of lactic acid in the brain increases whereas that of liver and heart is reduced, and even combined with fatigue, starvation or anxiety where over-all levels may be reduced, a diagnostic increase in ratio of brain to liver or heart is maintained. With Mr. G. A. Meek and Dr. J. G. Fitzgerald, the effect of ultrasonic energy applied directly to the carotid artery of dogs has been investigated. An apparatus has also been built to apply infrasonic vibrations in the region of 5 cycles per second. Further work on the effect of ultrasonic waves to hasten blood clotting has shown this effect to be more marked in venous blood. Treating arterial blood with CO gives values similar to those of venous blood. Work on the micro-accelerometer is being completed. It is proposed to apply the unit in rocket studies. Dr. Franks has also carried out preliminary studies for survival of test animals in space flight (rocket) tests, to permit investigation of possible radiation or acceleration effects.

In Professor E. Baer's Sub-department of Synthetic Chemistry, the synthesis of naturally occurring phosphatides and related compounds was continued. Dr. D. Buchnea completed the development of a method permitting the synthesis of saturated and unsaturated L- α -lecithins in structurally and optically pure state from L- α -glycerylphosphorylcholine (L- α -GPC) by acylation of its cadmium chloride complex. Distearoyl-, dimyristoyl- and dioleoyl-L- α -lecithin were prepared by this method. The synthesis of more highly unsaturated L- α -lecithins from L- α -GPC is in progress. Further work carried out by Dr. Buchnea involved attempts to simplify our procedure for the synthesis of L- α -GPC, the synthesis of unsaturated polyphosphatidic acids as cardiolipin substitutes in the serodiagnosis of syphilis, and the synthesis of an unsaturated phosphatidyl serine for a study of its supposed anticoagulant activity. Dr. A. Duke carried out the synthesis of a lecithin homologue, containing propylene glycol instead of glycerol, and thought to be a constituent of ox brain. Dr. T. Gróf has been pursuing the synthesis of water-soluble cephalins containing C₆ and C₈ fatty acid substituents, Dr. V. Mahadevan that of water-soluble lecithins, and Dr. A. Zschoke of phosphatidyl hydroxyproline. Mr. H. H. Flehmig capably assisted the members of this sub-department in their work.

In Professor G. A. Wrenshall's section, several collaborative studies on the amount of insulin extractable at autopsy from the human pancreas are in progress on: (i) diabetic Jamaican subjects; (ii) infants of diabetic mothers; (iii) subjects with diabetic glomerulosclerosis; (iv) diabetic subjects previously tested for response to oral hypoglycaemic agents. Dr. L. Lax is concluding a very comprehensive experiment designed to measure the action of triiodothyronine on phosphorus transfer in all parts of the rat. Dr. G. Hetenyi, with Dr. Wrenshall, has developed and tested a basic procedure for measuring rates of transfer and accumulation of plasma constituents which avoids many assumptions used in other available methods. He is studying plasma glucose turn-over using the new method.

Professor James M. Salter and Miss Susette Ruedy have continued studies of the effect of glucagon on the metabolic rate amino acid metabolism and on urea synthesis by liver slices *in vitro*. Dr. Salter has also continued to study the mechanism through which glucagon acts to suppress the growth of experimental tumours. The morphological and cytochemical changes produced by glucagon in the pancreases of rabbits have been investigated in conjunction with Dr. John Logothetopoulos. Attempts to determine the role normally played by glucagon in homeostasis are also in progress. Dr. C. K. Gorman has carried out investigations designed to elucidate the roles played by somatotrophin and insulin in the regulation of fat and protein metabolism.

In Professor G. R. Williams' section, the continuous flow method has been used to examine a number of aspects of the metabolism of the isolated rat diaphragm. In a newly initiated programme, the effect of various supporting media upon the access of choline to mitochondrial choline oxidase has been examined and preliminary experiments upon the metabolism of S-adenosyl methionine have been performed.

In Dr. J. Logothetopoulos' section, a study has been completed on the cytotoxic effects of intravital metal-chelating reactions on the prostate of the rat. Dithizone was the only compound among a series of zinc-chelating agents which produced an extensive necrosis of the gland. A time study of the processes of repair and regeneration has been made. In collaboration with Dr. James M. Salter, investigations have been carried out on the effects of glucagon, insulin and glucose infusions on the cytology and cytochemistry of the islets of the pancreas. In an experiment with Dr. B. B. Sharma and Dr. Salter, rabbits were injected with glucagon from the first week of their birth. A diabetic condition developed within three to four months and, in half of the animals, persisted after the cessation of the injections. The "metaglu-cagon diabetes" is at present under investigation. A further experiment is being carried out to study the effects of thyroxine and of natural and synthetic corticoids on the function and growth of the thyroid and of the adrenals. The histochemical study of the islets of the pancreas under conditions of induced hyper- and hypo-function is being continued.

Professor E. Schönbaum has carried out studies on various aspects of adrenocortical function in the rat. In addition to observations on the response to low environmental temperatures and to shock, in collaboration with Professor R. E. Haist and Dr. Rosemary Hawkins (Department of Physiology) and with Dr. O. Heroux of the section of Applied Biology, National Research Council, Ottawa, studies were made on the action of adrenal corticotrophic hormone on the adrenal cortex. A joint project with Dr. D. G. Baker and Mr. K. R. Bowler of the effect of whole body X-irradiation on the adrenocortical function was concluded. With Professor E. A. Sellers (Department of Pharmacology), studies on thyroid function were continued. With Professor W. G. Bigelow and Dr. A. S. Trimble, of the Department of Surgery, further biochemical studies of the hibernating gland of ground hogs are in progress.

Dr. D. G. Baker, assisted by Miss E. Cartwright and Miss N. Birkett, has continued as technical director of the Radiation Research Unit. Dr. Baker has extended his studies of the metabolic disorders in irradiated guinea pigs to include the influence of dose rate. Correlated with this project has been an investigation of the effect of varying dose, dose rate and of divided doses on the acute lethality of irradiated mice. With Dr. G. Clark, Department of Zoology, cellular physiology as modified by irradiation has been investigated. The test systems used have been *Fagopyrum esculatum* (having different degrees of ploidy) and *Tetrahymena pyriformis*. The facilities of the Radiation Research Unit were made available to a number of the University staff wishing to use radiation in the course of their investigations.

Dr. B. Rosenfeld and Miss Jessie M. Lang have continued their studies on liver lipids. They have found that the "free" liver lipid which they obtained with their cold solvent extraction procedure is identical with the lipids present in the floating layer of liver homogenates obtained by high-speed centrifugation. Since it could be demonstrated that the lipid obtained by high-speed centrifugation is readily stainable with fat stains, it was concluded that their new solvent extraction procedure offers a method for the quantitative estimation of "stainable" fat in organs and tissues.

Dr. Anna Sirek, in collaboration with Dr. Otakar Sirek and Miss Yana Hanus, has completed her studies on the effect of the oral hypoglycaemic agent, tolbutamide, in normal and depancreatized dogs. The drug was administered in various amounts for prolonged periods of time up to twenty months. It was found that tolbutamide, in this species, causes severe impairment of liver function. A number of conventional liver function tests became highly positive and histological examination revealed foci of necrosis, accumulation of bile in bile canaliculi and peculiar cytoplasmic inclusions are found in liver cells of two animals maintained on the drug for twenty months. A study of the behaviour of liver function tests in diabetic patients treated with tolbutamide is in progress in collaboration with Dr. Bernard Leibel.

The Comptroller, Mr. C. R. Cowan, assisted by Mr. K. R. Bowler, has continued to provide invaluable assistance and advice to this Department and to the Department of Physiology.

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